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ALTGELD HALL STACKS

COMMITTEE ON RIVERS AND HARBORS,
HOUSE OF REPRESENTATIVES, U. S.

PROPOSED SHIP CANAL CONNECTING THE GREAT LAKES AND THE ATLANTIC OCEAN.

STATEMENT
OF
MR. S. A. THOMPSON,
OF DULUTH, MINN.,

FRIDAY, APRIL 1, 1898.

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PROPOSED SHIP CANAL CONNECTING THE GREAT LAKES AND THE ATLANTIC OCEAN.

COMMITTEE ON RIVERS AND HARBORS,
Friday, April 1, 1898.

The Committee on Rivers and Harbors this day met, Warren H. Hooker in the chair.

STATEMENT OF MR. S. A. THOMPSON, OF DULUTH, MINN.

The CHAIRMAN. Mr. Thompson, will you take the end of the table, and you may proceed.

Mr. THOMPSON said:

Mr. Chairman and gentlemen of the committee: The question of a navigable connection between the Great Lakes and the sea is not by any means a new one.

Washington considered that the very existence of the young Republic depended on the construction of roads across the Alleghanies to the valley of the Ohio and the connection of the lakes with the Hudson by canal. The ink was scarcely dry on the treaty acknowledging the independence of the United States when a survey was made for this purpose, and in 1796 work was begun in the Mohawk Valley by the Western Inland Lock Navigation Company, whose charter from the State of New York had been secured in 1792 by Washington himself.

The Erie Canal was completed in 1825, but the very next year surveys were made for a larger canal. Nothing further came of this, however, and in 1835 the President of the United States ordered a new set of surveys for a still larger ship canal around the falls of Niagara. A mere enumeration of the charters granted, surveys made, reports called for, and estimates submitted would be too tedious, so I merely mention the report made in 1864 by an engineer appointed by President Lincoln, and call attention to the fact that the latest survey was finished in 1867, and then pass at once to the present period.

Convention after convention has been held in recent years asking of Congress an appropriation sufficient to pay for a new survey which should determine the relative feasibility of various routes and furnish data for an estimate of the probable cost. Bills and resolutions for this purpose were introduced in each succeeding Congress, but all were defeated until March 2, 1895, when a joint resolution introduced by Senator Vilas, of Wisconsin, became a law. This provided for a commission of three, to be appointed by the President, who were to serve without pay, and for whose expenses in considering so vast a project the beggarly allowance of $10,000 was made.

DEEP WATERWAY COMMISSION.

On November 4 of the year last named President Cleveland announced the appointment as commissioners of Messrs. James B. Angell, of Ann Arbor, Mich.; John E. Russell, of Leicester, Mass., and Lyman E. Cooley, C. E., of Chicago, Ill.

On January 18, 1897, that commission made a comprehensive and masterly report, the engineer member (Mr. Cooley) embodying therein, without fee or reward, the accumulated data of a lifetime. That report I hold in my hand.

Mr. MORRIS. I wish you would give the number of that document.

Mr. THOMPSON. It is labeled "House of Representatives, Fifty-fourth Congress, second session, Document 192."

CONCLUSIONS OF THE COMMISSION.

The commission stated as a result of its study "that it is entirely feasible to construct such canals and develop such channels as will be adequate to any scale of navigation that may be desired between the several Great Lakes and to the seaboard, and to conduct through the same domestic and foreign commerce, and that in our opinion it will be wise to provide for securing a channel of a navigable depth of not less than 28 feet," and recommended that complete surveys and examinations of the various possible routes be made, with full investigation of all collateral questions, at an estimated cost of $600,000.

MAJOR SYMONS'S RECOMMENDATION.

More recently, under a provision of the river and harbor act of June 3, 1896, Maj. Thomas W. Symons, Corps of Engineers, stationed at Buffalo, has made a report on a "preliminary examination for a ship canal from the Great Lakes to the navigable waters of the Hudson River, of sufficient capacity to transport the tonnage of the lakes to the sea."

That report I have here, and it is labeled "House of Representatives, Fifty-fifth Congress, first session, Document 86."

Major Symons differs radically in his conclusions from the commission, for, while they recommend a ship canal with a depth of not less than 28 feet, he considers that the best solution of the problem is to be found in a barge canal along the line of the present Erie canal, or a slight modification thereof, with a depth not exceeding 12 feet, and recommends a survey for such a canal at an estimated cost of $50,000. My friend, General O'Brien, who is here this morning, and some other gentlemen not now present, had a hearing before this committee some days ago, at which time they advanced arguments in favor of the project recommended by Major Symons.

I am heartily in favor of his recommendation of the survey, for I believe in a thorough study of the whole situation and a survey of all possible routes, but with your kind permission I desire to give you this morning a few reasons why I believe a deep-water ship canal is the proper thing.

TRANSPORTATION A TAX.

The cost of transportation, although not imposed by legislation, or collected by governments, is none the less a tax, which bears with greater or less weight upon production and consumption alike. And I agree fully with ex-Governor Seymour, of New York, in his statement that—

> Economy of transportation is the chief element in the prosperity of every State and nation, and constitutes the marked difference between civilization and barbarism.

If this be true we shall most surely promote the prosperity of our country by bringing about the greatest possible economy of transportation, and business man and legislator alike are interested in finding an answer to the question, "What constitutes the cheapest form of transportation?"

AGENCIES OF TRANSPORTATION.

The wagon way, the railway, and the waterway compose the trinity of transportation agencies by which the commerce of the world is carried. There seems to be a very general misapprehension as to the relations existing between these three. In reality, each of the three is an integral and indispensable portion of a threefold transportation system, which would be radically defective if any of the three were lacking, and which can never reach the greatest efficiency of which it is capable, unless there is a symmetrical development of all the parts.

The wagon road is commonly considered to be subsidiary to the other two, and so it is in a sense, just as a foundation is subsidiary to the superstructure. And the railway and the waterway are generally considered to be antagonistic, and so they are in a sense and to a certain degree. For the three parts are not separated one from the other and hemmed in like lakes by rocky shores. Their fields of action overlap and their elasticity is so great that they can readily conform to all the ever-changing conditions and necessities of that complex thing called commerce. The wagon way, however, is essentially local, the railway continental, and the waterway world-wide in its sphere of action. The distinguishing characteristic of the wagon way may be called availability, as speed is undoubtedly the distinguishing characteristic of the railway, and economy, of the waterway. And in the last analysis these three will be found to be not competitors but complements, not antagonists but auxiliaries.

But because the sphere of action of the wagon way is local rather than general, and not because it is regarded as of less importance, it will necessarily be dropped from further consideration at this time, and I shall address myself to a brief discussion of the relations existing between the railway and the waterway.

REDUCTION OF RAILWAY RATES.

As has been stated, there seems to be a widespread misapprehension in regard to these relations—a misapprehension which probably exists in a more acute form in the minds of railway men than in the estimation of the general public.

Some twelve or fifteen years ago two gentlemen, both of them railway presidents, one of an Eastern, the other of a Western road, sat talking together, and the conversation turned upon the continually increasing efficiency and decreasing cost of railway transportation owing to the reduction of grades, the lessening of curves, and the building of more powerful engines and of cars which carried a much greater amount of paying freight in proportion to dead weight than formerly. The Eastern man stated that canal boats were played out, and that river steamers were about ready to follow the canal boats into permanent retirement, and expressed the opinion that it was only a question of time when the steamships would also be driven from the Great Lakes, leaving to the railways an undisputed monopoly of the carrying trade of the continent.

Great changes have certainly taken place in the matter of railroad transportation. It is but a few years since 20,000 pounds was the maximum weight carried by a freight car. Now cars which will carry 60,000 pounds are common, and those on the Carnegie coal and ore road will carry 100,000.

Locomotives are much more powerful also, and immense sums have been expended in reducing grades and curvatures, so that, owing to improvements of various kinds, the average train load is two or three times as great now as it was a short time ago. It is exceedingly interesting to note the successive reductions which have been made in the railway freight rates coincident with these improvements in methods. For, according to Poor's Manual, the average rate per ton per mile received by all the railways in the United States, which in 1882 was 1.236 cents, had fallen in 1890 to 0.941 cent, and had still further decreased to 0.821 cent in 1896.

Standing alone these figures would seem to justify the prediction of the railway president, but he forgot that it is possible to increase the efficiency of the steamship as well as of the railway.

COMPARATIVE REDUCTION OF RATES.

I have here a table compiled from the reports of the Chicago Board of Trade, showing the average charges for carrying a bushel of wheat from Chicago to New York for each year from 1868 to 1885, and by each of the three possible methods, viz, all rail, lake and rail, and lake, canal, and Hudson River. The table has not been extended beyond 1885, because there has been no material change since that time.

Calendar years.	Lake and canal.[1]	Lake and rail.	All rail.
1868	25.3	29.0	42.6
1869	24.1	25.0	35.1
1870	17.5	22.0	33.3
1871	21.6	25.0	31.0
1872	26.6	28.0	33.5
1873	19.2	26.9	33.2
1874	14.2	16.9	28.7
1875	11.4	14.6	24.1
1876	9.7	11.8	16.5
1877	7.5	15.8	20.3
1878	10.1	11.4	17.7
1879	13.0	13.3	17.3
1880	13.2	15.7	19.7
1881	8.6	10.4	14.4
1882	8.7	10.9	14.6
1883	8.40	11.5	16.5
1884	6.59	9.9	13.2
1885	4.55	9.0	14.0

[1] Including Buffalo charges and tolls.

From this table it appears that the all-rail rate has fallen in that time from 42.6 cents to 14 cents per bushel, while the all-water rate has dropped from 25.3 cents to 4.55 cents per bushel. That is to say, freight rates by rail have been reduced, in the period covered by the table, until the last price named is only one-third that first mentioned; but during the same time the all-water rate has been reduced to less than one-fifth of the rate first named. And more than that, the water rate has always been below the rail rate by a percentage ranging from 25 to 67.5.

The tables of average freight charges for the transportation of grain from Chicago to New York prepared by different authorities do not agree exactly. This is what might be expected, for rates fluctuate so rapidly and continuously that mathematically accurate averages are hardly attainable. The table here used was compiled by Major Handbury, of the Engineer Corps, United States Army, and probably represents an attempt to report the average rate at which the grain was carried, whereas the tables usually given represent simply the average of the various rates in force during the season.

The statement that no material change has been made since 1885 must be modified in one particular, as will be seen by an inspection of the following table of rates for years including and since that date, the figures being those published in the report of the Chicago Board of Trade:

Calendar year.	Lake and canal.[1]	Lake and rail.	All rail.
1885	6.54	9.02	13.20
1886	9.10	12.00	15.00
1887	9.50	12.00	15.75
1888	7.05	11.14	14.50
1889	6.92	8.97	15.00
1890	6.76	8.52	14.30
1891	6.95	8.57	15.00
1892	6.45	7.59	13.80
1893	7.66	8.48	14.63
1894	5.11	7.00	13.20
1895	4.86	6.96	11.89
1896	6.19	6.61	12.00
1897	5.22	7.42	12.50

[1] Including Buffalo charges.

Two striking facts are revealed by this table. One is that all-rail rates have fallen very slightly in comparison with the other two routes. The other is the close approximation of the lake-and-rail and lake-and-canal rates. *This shows that the principal reductions have occurred on the lakes, and that the Erie Canal has been largely shut out from participation in the benefits of these reductions, which have been appropriated mainly by the railways east of Buffalo.*

REDUCTION OF LAKE RATES.

Because the through water rate to New York has not been materially reduced in recent years, it must not be supposed that rates on the Great Lakes have not fallen.

The careful records kept at the St. Marys Falls Canal, at the outlet of Lake Superior, afford an invaluable means of determining both the growth and magnitude of lake commerce and the remarkable and continous reduction of lake charges. From these records we find that the average rate charged on the traffic of Lake Superior was as folows:

Year.	Rate per ton per mile.
	Mills.
1887	2.3
1891	1.55
1896	0.99

Compare also the rates (by lake) on wheat per bushel from Chicago to Buffalo for a number of years:

Year.	Cents.	Year.	Cents.
1886	3.68	1892	2.19
1887	4.13	1893	1.66
1888	2.56	1894	1.27
1889	2.51	1895	1.92
1890	1.96	1896	1.63
1891	2.38	1897	1.56

At the meeting of the Lake Carriers' Association, held in Detroit in January, 1896, it was stated that in 1895 the average rate received on the traffic passing through the Detroit River was 0.85 mill per ton per mile.

AN OBJECTION ANSWERED.

It is sometimes objected that it is unfair to compare the average rates on rail and water traffic, since lake cargoes, as a rule, are composed of materials which are handled in bulk and are carried long distances, while railway traffic is made up largely of package freight which is hauled short distances. I find no material difference in the relative rates, however, when the comparison is limited to articles which are transported in bulk and for long distances by both methods of transportation.

Secretary Wyman, of the Duluth Board of Trade, states that much of the time during the season of 1897 the rate on wheat from Duluth to Buffalo, 1,000 miles, was 1 cent per bushel, equal to 0.33 mill per ton per mile, while the return freight on coal was 20 cents per ton, or 0.2 mill per ton-mile. There were many boats which carried wheat down and coal back, and made money at it, too, although their recipts averaged only 0.265 mill per ton-mile, which was only one-seventeenth of the rate on wheat by rail from Chicago to New York.

The Pittsburg, Bessemer and Lake Erie Railway, known as the "Carnegie Road," was built and equipped especially for the coal and iron-ore traffic, with low grades, heavy rails, powerful locomotives, and cars that can carry 100,000 pounds.

It was stated when the construction of the road was begun that it was expected to reduce the cost of carrying ore to 3 mills per ton-mile. This was to be, as I understand it, the cost to the road, not the charge to the shipper. I have not at hand a statement of results of the operations on the road from which to learn whether these expectations have been realized or not, but grant that they were, and then compare this railway cost price with the rate on ore from Lake Superior points to lower lake ports, which for weeks during the season of 1897 was but 50 cents per ton, equal to 0.56 mill per ton-mile.

EFFECT OF DEPTH ON RATES.

The Erie Canal has a nominal depth of 7 feet and an available depth of 6 feet, and rates are about 3 mills per ton mile. On some of the canals of Europe, which have 9 to 10 feet of available depth, rates are about 2 mills per ton mile. The progressive reduction in lake rates has not only been coincident with, but mainly caused by, the deepening of lake channels and harbors, with the increased size of vessels thereby rendered possible.[1]

Referring again to the table of comparative reduction of rates from Chicago to New York which has already been given, a marked decrease will be observed between 1872 and 1876. This decrease has been permanent also, for while rates have fluctuated both before and after the dates named, it is a striking fact that the rate since 1876 has never again been one-half as much as it was in 1872.

Turn now to the reports of the Chief of Engineers, and we find that the project of 1872 for the deepening of the St. Clair Flats Canal was completed in the latter part of 1875. The marked decrease in the rate from 26.6 cents in 1872 to 9.7 in 1876 was exactly coincident with the most marked increase in available depth of lake channels which had been made up to that time; but the reduction of rates was not a mere coincidence, it was the direct consequence of this deepening of channels.

If you call my attention to the fact that rates, as shown by the table, were lower in 1870 than in 1872, before the improvements were begun, and higher in 1880 than in 1876, after the improvements were completed, I can, of course, enter no denial. But let me call your attention to this diagram of water levels on the lakes (No. 17 in the Report of the Deep Waterways Commission), and you will see that the levels of the lakes are not constant, but vary quite widely—the difference between the lowest point in 1872 and the highest point in 1876, as recorded at Milwaukee, being 3.6 feet. If we should construct a diagram showing by one line the rise and fall of rates and by another the variation in the depth of lake channels, the parallelism of these two lines would be so marked and striking that no further argument would be needed to show the effect of channel depths on transportation rates.

INCREASED SIZE OF LAKE VESSELS.

Incidental reference has been made to the increased size of lake vessels which has followed the deepening of lake channels. The following table, taken from "Statistics of Lake Commerce," by George G. Tunell (House Doc. No. 277 Fifty-fifth Congress, second session), shows the increase in the average size of vessels constructed for the years specified:

Average gross tonnage of sailing and steam vessels built on the Northern Lakes.

Fiscal year.	Sailing vessels.	Steam vessels.
1868	174.34	176.28
1869	180.26	173.23
1870	149.59	146.85
1871	230.65	267.22
1872	227.40	265.43
1873	364.64	203.99
1874	337.31	247.34
1875	197.88	178.29
1876	71.62	113.57
1877	92.60	97.48
1878	45.60	157.15
1879	39.10	262.32
1880	113.47	220.09
1881	248.77	450.28
1882	244.90	262.31
1883	189.31	172.53
1884	264.39	252.56
1885	128.70	316.07
1886	348.80	269.10
1887	142.60	629.10
1888	190.22	624.70
1889	253.05	646.25
1890	355.65	741.57
1891	241.34	758.72
1892	84.74	366.98
1893	441.76	604.45
1894	304.05	491.39
1895	[a]144.86 371.16	457.17
1896	581.46 1,148.69	1,009.91
1897	301.37 1,505.80	1,436.91

[a] The upper figures of the years 1895-1897, in the column headed "Sailing vessels," represent the average of the sailing vessels after the tonnage of the steel sailing vessels (commonly known on the lakes as barges) has been removed.

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[1] The effect of the substitution of steam for sails as the principal means of propulsion, and of iron and steel for wood as the principal material of construction, is neither forgotten nor ignored, but these changes are not the chief cause, in my opinion, of the reduction of rates which has occurred.

The remarkable increase in the average tonnage of the steam vessels and the steel sailing vessels or barges built in 1896 and 1897 is due, of course, to the opening of the "Twenty-foot Channel." This table of average tonnage does not show the real character of the modern lake fleet as well, perhaps, as a statement of the dimensions and carrying capacity of some of the larger craft.

The steamer *George Stephenson* has moved 323,250 bushels of clipped oats, weighing 6,137 net tons, from South Chicago to Buffalo on a draft of 16½ feet.

The steamer *Crescent City* has carried 6,300 net tons of corn (225,000 bushels) on a draft of 17 feet.

The schooner *Amazon* has carried 6.307 net tons of iron ore from Duluth to South Chicago on a draft of 17 feet 1 inch, being the largest cargo yet carried on the lakes, so far as I am informed. But one who attempts to give absolutely accurate statistics regarding lake commerce finds himself very much in the predicament of the lad who could not tell how many brothers and sisters he had, because he "hadn't been home since morning."

The cargoes mentioned are large, but they do not represent the limit. There is now building for the Bessemer Steamship Company, in the yards of Messrs. F. W. Wheeler & Co., West Bay City, Mich., a steamer 475 feet long, with a beam of 50 feet and a depth of 29, which will carry 7,500 net tons on a mean draft of 17 feet.

The twentieth century will not be very old when cargoes of 10,000 tons will be carried on the lakes. When that times comes the present almost infinitesimal rates per ton mile will be so much reduced that some sort of a financial microscope will need to be devised to make them visible at all.

ACTUAL COST OF TRANSPORTATION.

Before turning from the discussion of relative rates to other matters it will be worth while to study the absolute cost of transportation, so far as we can get at it, in order to judge whether the railway is likely in the near future to rival the waterway in cheapness of carriage.

Careful experiments conducted on the Grand Trunk Railway showed the actual net cost of the movement of freight, exclusive of interest on bonds and other fixed charges, to be 5 mills per ton per mile. That was some years ago, and a better showing might be made at present, although the average cost reported to the Interstate Commerce Commission is some 10 per cent greater than this. The Pennsylvania Railroad is considered one of the best-managed roads in the country, and the net cost of freight movement thereon is stated to be 3.85 mills per ton-mile.

On the Erie Canal the cost is only half as much, or about 2 mills per ton mile. On some of the Belgian canals, where steam towage is used, the cost has been reduced to one and a half mills, while on the Aire and Calder Canal in England, General Manager Bartholomew, who seems to be the greatest genius in canal management whom the world has yet produced, reports that he has been able to reduce the cost of transporting minerals to 0.024 cent per ton per mile, and for general merchandise to 0.068 cent, the average being 0.046, and the cost of returning the empties being included in each case. The figures grow more and more interesting as we go on, and when we turn to the Great Lakes, where we have deeper water, we find results which are almost startling.

The Western railway president before mentioned related some time ago the incident of his conversation with the president of the Eastern railway, and added:

> I might have continued to share his belief in the ultimate triumph of the railway over the steamship if I had not had occasion to build and operate a line of steamships myself. These boats carry 2,700 tons of freight on the present depth of water at the Sault, make the run from Duluth to Buffalo in three days and a half, and cost an average of $120 per day.

Calling the distance from Duluth to Buffalo 1,000 miles. and we find these figures are equivalent to 0.015 cent per ton per mile, only one twenty-sixth the cost on the Pennsylvania road. Or, to state the same fact in a form which will be more readily understood by the average business man, it costs $26 on one of the best-managed railroads in the United States to do what is done on the Great Lakes for $1. To be strictly accurate, I should say "what *was* done on the Great Lakes for $1," for the words quoted were spoken before the new lock at the Sault or the "Twenty-Foot Channel" were completed.

If we could get at the cost of transportation on these same boats at the present time, to say nothing of the 6,000-ton cargo carriers that have been mentioned, the difference would be more startling still; and the end is not yet.

Mr. BISHOP. In figuring the net cost do you figure in the cost of the vessel, interest, and natural wear and tear of the vessel?

Mr. THOMPSON. I think the figures in both cases include merely the absolute cost of the movement. I admit that standing alone these figures do not constitute a complete argument, but it is one way of getting light upon the question whether the railroads are entitled by right of cheapness to carry all the traffic of the continent.

Mr. MORRIS. Is not the wear and tear upon a railroad much greater than that upon steamships?

Mr. THOMPSON. It always is.

A STRIKING STATEMENT.

The difference in cost between rail and water transportation becomes still more striking when stated in another way. The traffic into and out of Lake Superior in 1897 amounted to 18,982,755 tons. If this had been carried by rail, at the average rate received by the railroads in 1897, it would have cost over $115,000,000 more than was actually paid for its transportation by water. And this is the saving on the business of one lake only. The ton-mileage for all the lakes in 1897 was, approximately, 36,000,000,000 tons, and the direct saving in the transportation of this water-borne traffic was not less than $250,000,000. And the indirect saving to the public, resulting from the reduced railway rates arising from the competition of this great waterway, was probably greater still.

EFFECT OF WATERWAY ON RAILWAY RATES.

For the waterway not only furnishes the cheapest possible form of transportation, but it is also the most powerful possible regulator of railway rates. On roads subject to direct water competition rates invariably go up when navigation closes in the fall and go down again when navigation reopens in the spring. I recall one year when the rate on wheat from Buffalo to New York was more than doubled, going from 3½ to 7½ cents per bushel on the day the Erie Canal froze up.

A study of the statistics in Poor's Manual, or the report of the Interstate Commerce Commission, shows that the lowest rates are found on roads most subject to water competition. Take, for instance, the Lake Shore and Michigan Southern, with its average rate of .653 cent, and the Michigan Central, with .726 cent per ton per mile, and compare these with the rates on the Chicago, Milwaukee and St. Paul and Chicago and Northwestern roads, which were 1.06 and 1.03, respectively. A multitude of similar facts could be adduced, but the strongest proof of the supreme control exercised by waterways on railway rates is furnished by the raliway men themselves. In an argument before the Committee on Commerce of the House of Representatives, made in opposition to the "Reagan bill," in March, 1882, Mr. G. R. Blanchard, the well-known railroad attorney, said:

> The rail carrying charges upon the great east-bound traffic to the seaboard, for both consumption and export, are, therefore, and must continue to be, limited by natural causes, and can not be beyond or as much as those which in their absence would be deemed fair and reasonable, and are always below the rates for like distances, articles, and speed by rail anywhere in the world. So potent are these facts that it is within the power of and is often the case that the combination or independent action of a few sail vessels at Chicago can, in their seasons of navigation, procure rates from owners of an equal capacity of Erie Canal boats from Buffalo to New York, which, added to their own rates to Buffalo and transfer charges, will fix, and have in actual practice fixed and regulated, the entire eastward through maximum rail freight charges, for a time, upon all kinds of grain and many other articles. * * * Can any safer limitation or check be legislated than the inflexible limitations nature enforces in its uncontrollable rivalry? * * * The application of water results are inexorable in their effects upon railroad rates within periods ranging from seven to eight months in each calendar year and usually all the year in rivalry with Western rivers. * * * In view of all these facts, I now say with Mr. Fink: "Compared with this powerful regulator of railroad transportation tariffs, the efforts of State or Congressional legislation to prevent extortionate charges appear to those at all conversant with the subject as perfectly useless."

To such a statement from such a source nothing need be added.

FAR-REACHING INFLUENCE OF WATERWAYS.

It should be noted also that the influence of water competition is not confined to the roads which lie close along the waterway. Mr. Albert Fink, the railroad commissioner, used the following words in 1878, in a letter addressed to Hon. William Windom, who was at that time chairman of the Senate Committee on Transportation Routes to the Seaboard:

> You are aware that when the rates are reduced between Chicago and New York on account of the opening of the canal, this reduction applies not only to Chicago, but to all interior cities (St. Louis, Indianapolis, Cincinnati), to New York. If that was not the rule, the result would be that the roads running, say, from St. Louis, Indianapolis, and Cincinnati to Chicago would carry the freight to Chicago, from which point low rates would take it to the East and leave the direct road from the interior points to the seaboard without business. Hence, whenever the rates are reduced on account of the opening of navigation from Chicago and lake ports, the same reduction is made to all interior cities, not only to New York, where the canal runs, but to Philadelphia and Baltimore. Although the latter cities have no direct water-route communication with the West, yet they receive the benefit, as far as railroad rates are concerned, the same as if a canal were running from the lakes direct to these cities, because whenever rates from Chicago to New York are reduced it is necessary to reduce the rates from Chicago to Boston, Philadelphia, and Baltimore, otherwise the business would all go to New York. The reduction of the rates from Chicago and St. Louis to Baltimore causes a reduction in rates on shipments via Baltimore to Atlantic ports—Norfolk, Wilmington, Savannah, Brunswick, and Fernandina—and from there into the interior of the Gulf States—Augusta, Atlanta, Macon, Montgomery, Selma, etc. * * * These roads * * * are obliged to follow the reductions made via the Baltimore road, and which were primarily made on account of the existence of the Erie Canal and the opening of navigation. The same way in regard to the west-bound business, * * * so that it may be said that the rail rates are kept in check by water transportation.

Nor is water competition confined in its effect entirely to the season of navigation. The same authority last quoted testified before the Senate Committee on Interstate Commerce that, at least so far as grain rates are concerned, that influence extends throughout the winter. "For," said he, "if the rail rates are made too high, the grain is simply stored to await the drop in rates which is certain to come when navigation is opened."

A TRANSPORTATION PARADOX.

In the light of the facts I have stated, showing that waterways carry more cheaply than railways, and modify the rates received by the railways themselves, it is perhaps not surprising that the average railway man is distinctly hostile to waterways. In the report by Major Symons, which has been referred to—and I suppose it is always in order to quote a member of the Engineer Corps before this Committee on Rivers and Harbors—I find it stated that in 1895 the trunk lines carried grain at rates which involved a heavy loss to themselves, with the deliberate intention of so discrediting the Erie Canal as to prevent the people of New York from voting money for its improvement, and the hope that the ultimate result would be to destroy the canal as a competitor.

But I state as my deliberate conviction that the best thing that could happen to every railroad in the United States or elsewhere would be to have a waterway at least 21 feet deep paralleling every mile of its track. And furthermore—for I want to make the statement as strong as possible to begin with, so as to attract your attention, and then proceed to prove it beyond dispute, if I am allowed the time—furthermore, instead of trying to destroy the Erie Canal, the managers of the trunk lines of railway between Buffalo and New York City ought to underwrite the bonds to secure the construction of a ship canal 28 feet deep from the Great Lakes to the Hudson and get it built as soon as possible; and this not at all as a matter of sentiment or patriotism, but as a cold-blooded business proposition. For paradoxical as the statement appears, it is nevertheless true that parallel waterways are the most powerful possible promoters of railway traffic and dividends. And now to the proof.

SOME VERY SUGGESTIVE FIGURES.

During the fifteen years that improvements were being made on the Elbe River, the river traffic, as a natural result of the deepening, increased fivefold. But the traffic on the competing railways increased still more largely, and the dividends on the main line, from Teplitz to Aussig, rose to 16 per cent. I know holders of American railway stocks who would be glad to receive less than half as much as that. A coincidence, you think? Well, possibly. But if it be, I have a fine lot of striking coincidences to submit for your consideration.

If our State of Texas were made into a circular sea and France into a circular island, there would be a strip of water more than one hundred miles wide all the way around that island. Yet France, with an area so small in comparison with even one of the United States, has expended from the national treasury since 1814 more than $750,000,000 on waterways, in addition to more than $700,000,000 on railways, and $650,000,000 on wagon roads.

For many years the ease with which France, in addition to the cost of the war and the ruin and desolation caused by the war, paid off the enormous indemnity exacted by Germany was for me an unexplained mystery. But when I learned that France has what is probably the most highly developed and symmetrical transportation system in the world, I wondered no longer—the mystery was solved. The cost of bringing into the country all they had to buy, the cost of carrying out of the country all they had to sell, the cost of distributing throughout the country the products of the different departments, had been reduced to the minimum. The people of France paid their war taxes easily, because their transportation taxes were so low.

They began building canals in France one hundred and six years before Christ was born, and they have not stopped yet. They have now over 8,000 miles of canals and navigable rivers in France, about 1 mile to each 25 square miles of territory, while the United States has only about 1 mile of such waterways to 1,000 square miles of area.

There has been rivalry between railways and waterways in France as there has been in the United States and elsewhere, but fortunately for France, the power of the State has not only prevented the destruction of one form of transportation by another, but, on the contrary, has wisely brought about a systematic development of the whole trinity of transportation agencies—wagonways, railways, and waterways.

The debates in the Senate of France in 1863–1865 resulted in the declaration that it is to the interest of the state to foster both the railway and the waterway. This principle was reaffirmed in 1872, again in 1878, and still again in 1889, when it was stated that experience had fully confirmed the predictions which had been made. In proof of this statement the committee which had the matter under consideration pointed out the fact that out of 196 waterways and parts of waterways enumerated in the statistics of inland navigation only 73 had, in 1887, a tonnage of more than 70,000 mile-tons, *and every one of these was in close proximity to railroads*, while the Northern Railroad Company, whose system traverses a region which contained 43 per cent of the boating capacity of France, *was the only one that was not obliged to call upon the Government to pay the interest guaranteed upon its stock.* "This shows," said the committee, "that waterways, by increasing traffic, are rather the auxiliaries than the competitors of railroads."

And the people of France seem to be quite as well educated as to the value of waterway improvements as their legislators, for when a *plebiscite* was taken some years ago to ascertain the popular feeling as to a proposed canal from Paris to Rouen, at an estimated cost of about $40,000,000, out of 345,000 votes cast only 13 were opposed to the project. It would seem to have been in order for some gentleman to move to make it unanimous! And when the American people shall have learned as much about this subject as the Frenchmen already know, there will be far less criticism of river and harbor bills.

"MADE IN GERMANY."

Equally interesting and conclusive are some of the lessons to be learned from the experience of Germany. The canalization of the river Main from Mayence to Frankfort was completed in the latter part of 1886. As a result of this improvement, which gave a channel vastly deeper and better than was before available, the river traffic showed an increase of 64 per cent in 1887 and a further gain of 42 per cent in 1888. Frankfort is abundantly supplied with railroads, having among others an independent line on either bank of the Main all the way to Mayence. Did these roads go into bankruptcy or suffer a serious falling off in their traffic? On the contrary, their business increased 36 per cent in 1887 and an additional 58 per cent in 1888. Consul-General

Mason, from whose report these facts are taken, says (Special Consular Reports, vol. 5, p. 149):

> Nor is this all, nor even the most important part of it. The whole commercial and industrial life of the city has been quickened and restored by the new and improved conditions which the canalized river has entailed. * * * Not only has the commerce of Frankfort been largely increased by this cheapening of freights, but it has been improved both in symmetry and character. The proportion of outgoing and incoming merchandise has been more nearly equalized, and the traffic of both rail and river thereby made more economical and profitable. Formerly Frankfort had nearly everything to buy and very little to sell. The freight was nearly all incoming, and both boats and railroad cars went back empty. Cheap fuel and materials have now developed local manufactures and given this community a larger export traffic, *and the city, the railroads, and the river mutually profit by it.*

Two years constitute rather a short time to judge of the permanent effect of the improvement, but, fortunately, we have another report by the same trained observer, dated December 10, 1897. From this we find that the river traffic, which only amounted to 150,000 tons annually before the improvement, had increased to 700,000 tons in 1891 and to 1,693,112 tons in 1896, while the traffic by rail, which amounted to 930,000 tons in 1886, had risen to 1,400,000 tons in 1891 and to 1,639,229 tons in 1896, *being nearly double what it was ten years before when the railways had a practical monopoly of the freight business of Frankfort.*

There are many lessons to be learned from these instances, some of which I will point out later, and similar results by the score could be given, but I will give only one more from Germany and a few from the United States, just to show that the rule holds good here also, and then pass to another branch of the subject.

The greatest railway mileage in the world under one management is to be found in Germany, for out of a total of 16,281 miles of road on July 1, 1888, 14,665 belonged to the Government. Yet the Reichstag, in 1887, passed an act providing the completion of nearly 1,500 miles of canals and canalized rivers, although there were then finished and in use 1,289 miles of canal and 4,925 miles of navigable rivers. Other improvements have been authorized and completed since the date named, until to-day Germany has 8,700 miles of canals and navigable rivers and 17,064 miles of State-owned railways in Prussia alone.

Does anyone believe that the German Government would expend millions of marks out of the national treasury for the construction of waterways, if the result would be to reduce the revenues of the Government from its own railways? Or will American railway men, who, with a few honorable exceptions, are bitterly hostile to waterways, claim that the German Government did not know what it was about? Let us see. I quote again from Consul-General Mason:

> If further testimony on this general topic were needed, it would be found in the steady, growing prosperity of the railways of Prussia, which from their location are brought into most direct competition with the principal waterways. During the fiscal year 1896–97 the Prussian railroads earned $247,381,970, and the budget estimate, always conservative, for the current year is $264,000,000 from the same source. This is considerably more than half the entire income of the Prussian Government, and after deducting all expenses of operation, repairs, construction, new equipment, interest on bonds, etc., *leaves a net revenue of $52,122,000 to be turned into the treasury of the State.*
>
> That a portion of this surplus should be devoted each year to improving and extending the canal and navigable river system is in furtherance of a policy the wisdom of which time and experience have fully confirmed.

ILLUSTRATIONS CLOSE AT HAND.

It must not be supposed that the only illustrations of the beneficial effect of waterways on railways are to be found in foreign lands. There are plenty of them in the United States, only two of which, however, will be given.

For a number of years the United States Government has been improving the navigation of the Great Kanawha River by a system of locks and movable dams. Two railroads run along the banks of this river, the Chesapeake and Ohio and the Kanawha and Michigan. The following table, taken from the report of Mr. A. M. Scott, the resident engineer, shows that the shipments of coal by rail have increased even more rapidly than the shipments by river, but does not at all show the full extent of the benefit to railroads from this improvement, because it does not report the increased traffic in passengers, or of freight other than coal, which has resulted therefrom. The table shows the shipments of coal, in bushels, from points below Kanawha Falls for the fiscal year ending June 30:

Year.	River.	Rail.
1881	9, 628, 696	6, 631, 660
1886	17, 861, 613	13, 958, 747
1891	25, 761, 346	28, 668, 025
1892	26, 787, 888	30, 844, 100

No official record of shipments by rail has been kept since 1892, but a note from Mr. Scott informs me that they have increased very largely since that date.

Take up the newspapers any day you like and you will find the stock of roads running through a region well supplied with waterways quoted at prices far above the stock of roads running through a region not so supplied. The New York Central and the Lake Shore and Michigan Southern railways, considered as one, are paralled by a waterway practically all the way from New York City to Chicago; and where else in the United States will you find such a succession of prosperous cities and towns, almost in sight of one another, all the way from the metropolis of the whole country, on the sea, to the metropolis of the West, on Lake Michigan? And what other road has been compelled to build four tracks to accommodate its business.

The Chairman. You are leaving out the West Shore road. Are there not practically two more tracks?

Mr. Thompson. Yes; six tracks, practically, in the Vanderbilt system, and their business and dividends are steadily increasing. In my judgment these prosperous cities, these crowded profit-paying lines of rails, the very fact that New York is the largest city on the Atlantic coast—each and all are due to the Erie Canal. Improvements on that canal in recent years have not at all kept pace with the improvements on railroads, and it is relatively, if not actually, far less efficient than formerly. It is a significant fact that New York City handles a smaller proportion of exports than formerly, while there has been a large increase in the amounts which have gone out by Boston and Baltimore, Philadelphia and Newport News, and especially by Montreal. For instance, of the total exports from Atlantic ports, New York handled in 1892, 46.7 per cent of the wheat and 26.4 per cent of the corn, while in 1897 that city shipped only 35 per cent of the wheat and 17.8 per cent of the corn.

This result is largely due to the decreased relative efficiency of the Erie Canal, and if that waterway should be closed entirely, the royal robe of commercial supremacy would depart from New York City, to be parcelled out among her clamorous rivals, and the shortsighted managers of the trunk line railways would speedily find that they had undermined the chief corner stone of their prosperity.

ESSENTIAL FUNCTIONS OF RAILWAYS AND WATERWAYS.

I have spent considerable time on the benefits conferred on railways by waterway improvements, because I believe it to be a point of the greatest importance and one which is, in general, greatly misunderstood. It is worth while to spend a little more time in pointing out the reason for this paradoxical result.

The careful records kept at the Sault Canal enable us to learn all about the traffic to and from Lake Superior—character, points of origin, and destination, cost, etc.

Water traffic to and from Lake Superior, 1897.

Vessels		17, 171
Freight	net tons	18, 982, 755
Coal, hard	do	536, 199
Coal, soft	do	2, 502, 973
Flour	barrels	8, 921, 143
Wheat	bushels	55, 924, 302
Other grain	do	24, 889, 688
Manufactured and pig iron	net tons	135, 164
Salt	barrels	285, 449
Copper	net tons	122, 324
Iron ore	do	10, 633, 715
Lumber	M feet B. M.	805, 612
Silver ore	net tons	5
Building stone	do	6, 249
Unclassified freight	do	579, 048

It only needs a glance at this table to show that nine-tenths of the total freight consisted of raw materials, in which weight and bulk are large in proportion to value, iron ore alone constituting 56 per cent of the tonnage.

When the necessities of industry in Germany demanded rates on raw materials which were below the cost of working the railways, the State began the development of a complete and carefully planned system of waterways.

> German statesmanship was among the first to foresee that the time would come when railways having reached their maximum extension and efficiency, there would remain a vast surplus of coarse, raw materials—coal, ores, timber, stone, and crude metals—which could be economically carried long distances only by water transportation, and that in a fully developed national system the proper rôle of railroads would be to carry passengers and the higher classes of merchandise manufactured from the raw staples that the waterways had brought to their doors.

This is the language of Consul-General Mason, from whom I have quoted already, and to the same effect are the words of M. de Freycinet and the French legislative committee to which I have also referred:

> It is conceded that waterways and railways are destined not to supplant but to supplement each other. Between the two there is a natural division of traffic. To the railroad goes the least burdensome traffic, which demands regularity and quick transit; to the waterways gravitate the heavy freights of small value, which can only be transported where freights are low.
>
> Waterways, by increasing traffic, are rather the auxiliaries than the competitors of railroads. In procuring for manufacturers cheap transportation for coal and raw material, *they create freights whose subsequent transportation gives profit to the railroads.*

Herein we have a definition, clear-cut and accurate, of the essential functions of railways and waterways in a completely developed system of inland transportation, and a lucid statement of the reason for the benefits which invariably accrue to railways from the construction or improvement of parallel waterways. If a merchant had a ton of diamonds to transport, a difference of a few cents in the rate would not matter, but when we turn to raw materials the difference of a fraction of a mill, more or less, in the cost of transportation may mean the prosperity or the death of a great industry.

Take iron ore, for instance. For weeks during the summer of 1897 ore was carried from Duluth to Cleveland at 50 cents per ton, or 0.56 mill per ton mile. If the rate were 3 mills per ton-mile, the lowest cost of railway transportation yet reported—cost to the railway, mind you, not cost to the shipper—the charge for transportation from Duluth to Cleveland would be $2.54 per ton. As a matter of fact, red hematite ores of Bessemer quality were sold for $2.50 per ton at Cleveland after having been mined and carried nearly 100 miles by rail and nearly 900 more by water.

It is an undisputed fact that it is due primarily to the vast deposits of high-grade ore in the Lake Superior region that the United States has far surpassed Great Britain in that fundamental industry of modern civilization, the manufacture of iron and steel. Of these ores 13,681,522 net tons were shipped in 1897, and 120,084,472 gross tons have been shipped in all. More than $250,000,000 is invested in the mining and transportation of this ore, and I know not how many millions of people and hundreds of millions of capital are concerned in the manufacture and distribution of the finished products made therefrom. But if nothing but railway transportation was available for carrying this ore I venture to say that not one of the Lake Superior mines would be in operation, many a flaming furnace in Ohio and Pennsylvania would be cold, and many a busy manufacturing center would be silent, *for the ore could not stand the cost of carriage by rail.* If by any means navigation should be suspended on the Great Lakes, the enormous traffic carried on their waters would not be divided among the railroads. *It would simply cease to exist.*

And in merely giving a statement of the increased amount of railway tonnage which has resulted from waterway improvements, I have not stated the whole truth or the half of it, for the traffic has not only been increased in amount, but raised in character and made able to bear greatly increased rates per ton mile. And even that is not all, for it leaves out of account the additional revenue derived from passengers, express matter, and mails.

A RESPECTFUL SUGGESTION.

From the report of the statistician of the Interstate Commerce Commission for the fiscal year ending June 30, 1896, it appears that for the year named stocks aggregating $3,667,503,194 paid no dividends, while $515,029,668 of bonds, $276,611,094 of income bonds, and $68,918,680 of miscellaneous obligations paid no interest. These are large figures, and they become still more significant when stated as percentages, for the amounts named constitute 70.17 per cent of the total stocks outstanding, 87.96 per cent of the income bonds (and an additional 9.47 per cent paid only between 1 and 2 per cent), 11.40 per cent of the bonds, and 15.05 per cent of the miscellaneous obligations.

A study of the operations of the Great Western Railway of England, some years ago, showed that they were using 58 per cent of their total equipment in a traffic which brought in only 14 per cent of their revenue. Now recall the magnificent showing of the Prussian railways, which I have given, where all obligations were met, improvements provided for, and more than $52,000,000 turned into the State treasury; take a passing glance at the results of the "zone system" on the railways of Hungary, where a reduction of rates, reaching a maximum of 82 per cent, resulted in nine months in an increase of 165 per cent in the traffic and of 18 per cent in the net revenue; and glance again at the facts and figures I have given in the discussion of the true functions of railways and waterways, and then say if I am too presumptuous in suggesting that it is just possible that the railway men of the United States have not yet learned all there is to be known as to the methods of promoting the prosperity of their lines and providing for the payment of interest and dividends.

But I must now turn to the one specific point which I wish to discuss before the time is up. I believe I have already far exceeded, Mr. Chairman, the time you named.

The CHAIRMAN. Go ahead.

BARGE CANAL VS. SHIP CANAL.

Mr. THOMPSON. I desire to discuss the relative advantages of a barge canal and a ship canal. Major Symons has undoubtedly put out a report which is by far the strongest argument which has ever been made on that side of the question. I do not at all concede that the argument is unanswerable, but it is the strongest that has ever been made. I happen to know, from a statement of my friend General O'Brien, that Major Symons had the assistance—paid for, I understand—of four of the best experts in the country in the preparation of his report. And if you will give me $5,000 and a year's time I will get up a much better answer to his arguments than I shall be able to give this morning.

Mr. O'BRIEN. Will you permit me to correct you?

Mr. THOMPSON. Certainly.

Mr. O'BRIEN. I intended to have stated that we employed these engineers to examine Major Symons's conclusions. They did not assist Major Symons in any manner in getting up the report.

Mr. THOMPSON. Then I misunderstood you.

Mr. O'BRIEN. After the report was made public and transmitted to Congress, these eminent engineers were then employed to examine and investigate his conclusions.

Mr. THOMPSON. I am glad you corrected me, because I have no desire to make any statement, here or elsewhere, except the exact truth. However, as you know, Major Symons had an appropriation of $5,000 and was in a position to command the services of several persons connected with the Engineer service in compiling the mass of valuable data contained in his report. But our concern is with the report itself rather than with the manner of its preparation, and with your permission I will proceed to point out a number of errors made by Major Symons, which, in my opinion, entirely vitiate his conclusions.

THE MILITARY ASPECT.

Major Symons says:

> I am unable to believe that such a ship canal is needed for the military advantages it would confer. It would only be of use in the event of a war with Great Britain for the passage of our war ships from the sea to the Great Lakes. In the event of such a war, it is inconceivable that any of our war ships would be allowed to leave the seacoast for service on the lakes. All that we have, and many more in fact, would be needed for the protection of our seaports and for aggressive operations against the navy and commerce of Great Britain on the high seas. If proper

> and comparatively inexpensive precautions are taken, the Great Lakes will, in the event of such a war, need no naval assistance from the seacoast.
>
> An English naval force could only reach the Great Lakes by way of the St. Lawrence River and its canals, which latter limit the size of the vessels to those of a small class. These St. Lawrence canals lie along and near our border and within easy reach, and in some cases they can be enfiladed and even taken in reverse from good artillery positions on our side of the river. * * * Upon the upper lakes—Erie, Huron, Michigan, and Superior—the United States has a vast merchant marine, eight times greater in tonnage than the merchant marine of Canada, and vastly excelling in individual ships. If the Government, as has been suggested and recommended, would provide at the different lake ports stores of arms and war munitions suitable for arming our best lake vessels and arrange for taking possession of and arming and manning these vessels quickly and effectively, an American naval force could be improvised upon these lakes which would greatly preponderate over any which could be improvised against it or brought to oppose it.

I used to indulge that same bright dream of the rapid conversion of lake craft into battle ships, until it was rudely and permanently dispelled in an interview with Capt. Robley D. Evans, "Fighting Bob." He said:

> No one who has not had practical experience in such matters has any conception of the tremendous forces involved in modern high-power explosives. The energy let loose in firing even a 4-inch gun would be sufficient to lift one of your lake freighters bodily 4 feet out of the water, and the inevitable effect of putting such a gun on such a craft and firing it once would be that both gun and ship would go to the bottom. Of course these ships could be remodeled and braced and strengthened to stand the shock of modern guns, but that takes time, costs money, and destroys a good deal of the carrying capacity, and as for using them as they are, you might as well try to manure a farm with the bad smell from a fertilizer factory.

Within two years from the present time there will be a channel nowhere less than 14 feet deep from the lakes to the sea along the St. Lawrence. There are a large number of boats of various kinds in the British Navy which can enter the lakes on that draft. Something might be done in the way of land batteries, as suggested by Major Symons, unless the other fellows had taken the precaution to get their boats into the lakes before hostilities begun or war was declared. A single armored boat with a pair of 6-inch guns, once it obtained entrance into the upper lakes, could destroy the unarmored vessels of the lakes, one after another, and then bombard or levy tribute on all the lake cities from Buffalo to Chicago and Duluth.

Furthermore, while the St. Lawrence is the only route at present, it may not always be the only one. The Dominion Government has under consideration the construction of the Montreal, Ottawa, and Georgian Bay Canal, which would give a short cut entirely through Canadian territory, and utterly out of reach of our batteries. I had the honor to appear before a select committee of the Canadian senate a few days ago, and, speaking on behalf of the farmers of the West, to urge them to undertake and hasten that canal. I hope they will build it, and make it good and deep, because of the commercial advantage which it will be to our Western States, although when built the military advantage will be entirely on the side of Great Britain.

For, as a matter of fact, it seems to me less likely that we shall have a war with Great Britain than with any other nation on earth. Major Symons seems not to have seen the natural and necessary corollary of his own proposition, for if the lake fleet is of any value for defense against Great Britain on the lakes, it would be of equal or greater value for defense against any enemy whatever on the sea. The true military advantage of a ship canal to the United States would be that in case of a war, such as seems probable with Spain at this time, the entire $60,000,000 worth of vessel property on the lakes could be transferred to the seaboard and converted into unarmored cruisers, transports, colliers, etc.—in short, made ready to perform all the multitudinous and indispensable functions of a fleet of naval auxiliaries.[1]

The military advantages alone of a ship canal from the lakes to the Hudson would make it, in my opinion, worth vastly more to the United States than it would cost, and if supplemented with a canal from Lake Erie to Pittsburg, this military advantage would be still further and very greatly increased. Nevertheless, since the United States is a peace-loving rather than a warlike nation, and the commerce which would be affected by such a canal is so vast already and is increasing at such a marvelous rate, the controlling considerations which demand the construction of the canal are commercial rather than military.

CONDITIONS WHICH SHOULD BE CHANGED.

Grain and grain products constitute so large a proportion of the present freight from the lakes to the sea that Major Symons makes his comparative study on the basis of a bushel of wheat. He presents a table showing, for a series of years, the freight rates and transfer charges from Chicago to New York, but I shall quote only the average of these rates for the years 1892–1896, inclusive, as these average rates are the only ones used in his argument.

Average charges per bushel of wheat from Chicago to New York, 1892–1896.

	Cents.
By lake and canal, including transfer charges at Buffalo	6.059
Total freight, Chicago to Buffalo, including shoveling at Buffalo	1.748
Shoveling charge at Buffalo	.38
Net freight rate by lake, Chicago to Buffalo	1.368
Elevating and storage at Buffalo, receiving, weighing, and discharging	.875
Canal rate, Buffalo to New York, including trimming at Buffalo and shoveling at New York	3.436
Trimming charge at Buffalo	.105
Shoveling charge at New York	.150
Net rate for canal transportation	3.181

A study of this table reveals several interesting things, one of the most striking being the transfer charge at Buffalo. This is made up of the items for shoveling, elevating and storing, and trimming, and amounts, all told, to 1.36 cents per bushel, while the average charge for lake transportation is 1.368. That is to say, *it costs as much (within $\frac{8}{1000}$ of a cent) to lift the grain out of the hold of a vessel and drop it into a freight car or canal boat alongside as the vessel has received for carrying it 900 miles!*

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[1] This point has been emphasized in the most striking manner possible since the date of the hearing but before the revision of the stenographer's notes is complete; for war has been declared against Spain, and ships of every size, from tugs to the magnificent vessels of the American Line, have been taken out of the merchant marine and turned into naval auxiliaries.

What a splendid addition to this service could be made if our lake fleet could get out to the sea. There are more steel steamships of 1,000 tons or over under the American flag on the lakes than on the ocean, and many which are larger than any on the ocean, except the four ships of the American Line, the *New York*, *Paris*, etc. What valuable cruisers the two beautiful ships of the Northern Steamship Company, the *North West* and *North Land* would make, with their 5,000 tons burden and speed of 27 miles an hour.

The Government undertook to get one of the revenue cutters out of the lakes through the Canadian canals, cutting her in two and mounting the two parts on pontoons for the purpose. One of the pontoons slipped, and, as these lines are penned, one-half of the *Gresham* lies at the bottom of one of the Canadian canals, and bottom side up at that. What a spectacle! It will do to place alongside the sending of the *Indiana* to Halifax to be docked, because we had no dock of our own that could take her in.

I am glad that I can quote the official statement of Major Symons as to the reason for this remarkable fact. He says:

> The transfer charges on grain are fixed arbitrarily by the Western Elevating Association of Buffalo, a combination controlling all the elevators except a few small ones. The transfer charges at Buffalo are the source of complaint and dissatisfaction, and there is little doubt that they can be materially reduced and the business still transacted at a profit. * * * No grain will be received for transfer directly from vessels to canal boats, but * * * in addition to the elevating, receiving, weighing, and discharging rates, storage rates must also be paid, whether the grain merely passes through the elevator or remains in store the full limit of the ten days allowed. *This provision brings into the combination any of the floating elevators which could transfer grain directly into canal boats at a very low cost, and compels all grain to pay a minimum elevator charge of seven-eighths of a cent per bushel.*

This is one condition which should be changed.

The Erie Canal has a nominal depth of 7 feet and an actual depth of 6 feet. To quote Major Symons again:

> Most of the freight other than lumber originating in upper lake ports and destined for the seaboard via Buffalo is brought to Buffalo in the regular lines of boats belonging to, and run in connection with, one or the other of the great trunk lines of railway centering at Buffalo. A large part of the lumber coming down the lakes goes by Buffalo to Tonawanda, from which point it is shipped by canal and rail.
>
> The Erie Canal has no terminal facilities and no lines of lake vessels running in connection with canal lines, and so the canal boats, as a general thing, only get what freight they can pick up in Buffalo and Tonawanda.
>
> New York now places a very unwise and absurd restriction on the canal by limiting its use to corporations with $50,000 or less capital. A corporation to do business in a proper and economical manner should have several fleets of canal boats, with its own terminal facilities, and control of lines of lake steamers, and with the ability to give through bills of lading from the points of departure to any point along the canal. These objects are not attainable with a capital of $50,000. The effect of this restriction is to seriously handicap business on the canal, and if it is to remain in effective force the money[1] which New York is expending on the canal may be practically regarded as wasted. An effort was made to have this foolish law annulled during the session of the New York legislature just closed, but without success.

Here are evidently some more conditions which need to be changed.

Rates on the canal are about five times as great per ton mile as rates on the lakes, and although the canal handles a much smaller proportion of east-bound grain than formerly it still carries no inconsiderable amount, as appears from the following table, which I quote from Major Symons:

> The receipts of flour and grain at New York from May 1 to December 1, 1896, the time during which the canal was open, is shown in detail in the following table:

Route.	Bushels.	Per cent.
New York Central and Hudson River R. R.	23, 042, 001	20. 55
Erie R. R.	17, 942, 473	16. 00
Pennsylvania R. R.	3, 781. 101	3. 37
Delaware, Lackawanna and Western R. R	1, 469, 758	1. 31
New York, West Shore and Buffalo R. R	13, 335, 228	11. 89
Lehigh Valley R. R.	16, 785, 805	14. 97
Baltimore and Ohio R. R.	610, 311	. 55
Various other railroads	3, 047, 389	2. 72
Total receipts by rail	80, 014, 066	71. 36
River and coast	435, 389	. 39
Canal	31, 672, 499	28. 25
Total receipts by water	32, 107, 888	28. 64
Total receipts by rail and water	112, 121, 954	100. 00

Without lake connections, terminal facilities, effective organization, or adequate capital, opposed by powerful railway interests, throttled by elevator combines, and hamstrung by foolish legislation, the real wonder is, not that the canal carries less traffic than formerly, but that it carries any at all.

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[1] $9,000,000.

Conditions existing in Buffalo do not seem particularly satisfactory, but compared to those which obtain in New York they are little short of ideal. I quote again from Major Symons:

> The terminal and harbor facilities at New York City are peculiar, and the cost of handling traffic is excessive. Owing to the geographical conditions which prevail at this port, it is not possible to unite the railroad and vessel interests at one common point, but instead terminals and docks are required to be maintained at Jersey City, New York City, and Brooklyn. Owing to this condition, railroads are in a position to impose upon traffic an expensive elevator, lighterage, and warehouse system. The conditions, briefly stated, are that freight from the West is received in Jersey City, stored in Brooklyn, and shipped in New York, the points of receipt, storage, and shipping being thus widely separated.
>
> In the transportation of grain from the Western grain producing and storing centers the trunk lines terminating in New York City for many years have made it a part of the transportation agreement that they (the railroads) shall deliver the grain alongside of the ship without charge therefor, except as included in the freight rate.
>
> In pursuance of this agreement the railroads transfer grain from their cars through elevators into lighters by which it is transported in the harbor alongside of vessels, and for which transportation or lighterage a charge of 3 cents per 100 pounds, equal to 1.8 cents per bushel of wheat, is exacted by the lighterage companies doing the work.
>
> After the grain is put alongside of vessels it is transferred thereto by floating elevators, concerning which operation mention will be made further on.
>
> In order to avoid the expense of lightering, the railroads some years ago determined to transfer grain direct from stationary elevators into ocean vessels, and for that purpose constructed large and expensive elevators, fully adapted to the requirements of this business. The result of the building of these railroad elevators was the direct delivery of grain from them to vessels which came to the elevators to load. A large and constantly growing business was thus being built up, and the lighterage fee of 3 cents per 100 pounds saved.

This mode of delivery conflicted materially with the operations of the floating elevators, whose operations were being gradually confined to transferring grain arriving in canal boats from the Erie Canal. In order to allow the floating elevators to regain this business and to prevent a threatened rate war with Boston railroads, a set of rules and tariff of charges was promulgated, under date of October 16, 1882, by the railroad elevators in the port of New York, and of which rule 5 reads as follows:

> Receiving, weighing, and storing (grain) for the first ten days, or any part thereof, one-quarter of a cent per bushel, *and an additional charge of 1 cent per bushel if delivered to ocean vessels,* and one-quarter of a cent per bushel for all subsequent ten days or parts of the same, so long as the grain remains in store and in good order.
>
> This method is known as direct delivery, being direct from the railroad cars through the elevators to vessels without the intervention of lighters. The charge for this direct delivery is now practically the same as that exacted by the International Elevating Company of New York, a concern which has a monopoly of the floating elevator transfer business in New York Harbor.

So in New York the grain not only pays for storage, whether it is stored or not, but for lighterage, whether it is lightered or not. After it is in the lighter the charge per bushel for transferring it into ocean vessels is as follows:

	Cents.
Receiving, weighing, and discharging	0.625
Transportation of elevator	.500
Canal-boat trimming	.150
Trimming in vessel	.200
Inspection	.050
Total	1.525

Add to this the 1.8 cents lighterage and we get a total of 3.325 cents per bushel. This, however, is for railroad grain, and the lighterage charge is not imposed on canal grain. Strictly speaking, it may not be proper to include inspection fees among the transfer charges, but there is nearly always a charge for demurrage, or some other expense, so that 1.5 cents a bushel, the sum named by Major Symons, is the very least charge at which canal grain can be transferred in New York Harbor, and 3.3 cents for railroad grain. The actual cost probably does not exceed 0.25 and 0.75 cents, respectively.

SUGGESTIVE FIGURES.

By applying these transfer charges to the business actually done and getting the result in dollars and cents we shall obtain a much better idea of the tax imposed on the commerce in cereals by these elevator monopolies, and hence of the saving which would be effected by the construction of a ship canal, and of the source of some of the most active opposition to such a canal. The following table gives the receipts of grain at Buffalo for the years from 1888 to 1897, inclusive, the figures being taken from the reports of the Buffalo Merchants' Exchange, with the flour, as is customary, reduced to its equivalent in wheat and the transfer charges calculated at 1.36 cents per bushel, the figure given by Major Symons:[1]

Grain receipts and transfer charges at Buffalo.

Year.	Grain, including flour.	Transfer charges.
	Bushels.	
1888	99, 448, 150	$1, 352, 494
1889	118, 273, 430	1, 608, 518
1890	120, 540, 700	1, 639, 353
1891	164, 459, 720	2. 236, 652
1892	181, 769, 690	2, 472, 067
1893	188, 730, 370	2, 566, 733
1894	161, 401, 815	2, 195, 064
1895	163, 755, 128	2, 227, 069
1896	215, 352, 734	2, 928, 797
1897	261, 603, 688	3, 557, 810
Total	1, 675, 335, 425	22, 784, 561

The next table, also compiled from the reports of the Buffalo Merchants' Exchange, shows the total receipts of cereals at New York for the years 1888 to 1897, inclusive, with the amounts received by water and rail, respectively, and the percentages of each, flour, reduced to its equivalent in grain, being included as before:

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[1] This is the figure given by Major Symons in his detailed table of charges, although throughout his argument he drops the last figure and uses 1.3 cents. I prefer to retain it, however, for this insignificant fraction of a cent makes a difference of $156,962 in the cost of transfer of grain at Buffalo for the year 1897, and of $1,005,201 on the business of the past ten years. These figures are not insignificant by any means, and so long as the Buffalo elevator combine retains these fractions in its charges, I think it just as well to include them in the calculations.

Receipts of cereals at New York, showing amounts and percentages received by water and rail, respectively.

Year.	Received by canal, river, and coast.	Per cent.	Received by rail.	Per cent.	Total receipts of grain, including flour.
	Bushels.		*Bushels.*		*Bushels.*
1888	34, 969, 272	34. 05	67, 743, 869	65. 95	102, 713, 141
1889	35, 496, 528	32. 96	72, 213, 117	67. 04	107, 709, 645
1890	30, 766, 549	26. 19	86, 734, 727	73. 81	117, 501, 276
1891	32, 063, 952	20. 77	122, 163, 580	79. 23	154, 227, 532
1892	25, 120, 297	15. 05	141, 855, 159	84. 95	166, 975, 456
1893	44, 148, 473	30. 85	98, 978, 872	69. 15	143, 127, 345
1894	42, 679, 418	35. 50	77, 516, 949	64. 50	120, 196, 367
1895	15, 564, 037	13. 84	96, 783, 873	86. 16	112, 347, 910
1896	31, 969, 638	22. 06	112, 896, 916	77. 94	144, 866, 554
1897	21, 829, 261	11.99	160, 208, 381	88. 01	182, 037, 642
Total	314, 607, 425	23. 27	1, 037, 095, 443	76. 73	1, 351, 702, 868

I have not at hand statistics to show what proportion of the exports of cereals from New York City is received by rail and water, respectively, so I am forced to assume that the proportion is the same as for the total receipts. Because of the necessity of making this assumption the amounts given in the next table are without doubt much less than the actual figures, as it is a well-known fact that a large proportion of the grain and flour handled on through bills of lading from the West to Europe is taken from Chicago or Duluth to Buffalo by lines of steamers controlled by the trunk railroads, and carried thence to New York by rail.

And in order that no one may accuse me of stretching the figures in favor of my own ideas I have also assumed that all grain exported has gone through without delay or charge for storage, and hence at the smallest possible expense for transfer stated in or deducible from the report of Major Symons, viz, 1.5 cents for grain received by water and 3.3 cents for grain received by rail. Using these figures in connection with the percentages given in the table above, and applying them to the statement of exports from New York as given in the report of the Buffalo Merchants' Exchange (with one correction), and we get the results given below:

Exports of grain from New York and transfer charges thereon.

Year.	Grain, including flour.	Transfer charges.
	Bushels.	
1888	45, 672, 328	$1, 227, 261
1889	59. 567, 648	1, 612, 329
1890	65. 115, 191	1, 841, 835
1891	85, 944, 712	2, 514, 862
1892	104, 027, 540	3, 151, 098
1893	86, 909, 096	2, 385, 394
1894	66, 092, 804	1, 758, 729
1895	65, 247, 958	1, 990, 646
1896	89, 690, 648	2, 603, 648
1897	139, 016, 007	4, 287, 504
Total	807, 283, 932	23, 373, 306

Now combine the figures for Buffalo and New York, and we can begin to get some idea of what the proceeds of this tremendous toll-taking actually amount to, for they foot up $7,845,314 for the single year 1897, and reach a total of $46,157,867 for the period of ten years under consideration. This is toll-taking to some purpose, and no high degree of intelligence is needed to see that people who have such a business as that do not want to give it up. It is no wonder that there is active and energetic opposition to a deep ship canal, and that there are plenty of plausible arguments advanced *in favor of all the improvement of the Erie Canal which can be made without destroying the necessity of transfers at Buffalo and New York.*

If I may be allowed to make a suggestion to this honorable committee, I will say that if you desire to get at the root of the matter, whenever anyone appears before you to advocate the construction of a barge canal instead of a ship canal, put him under oath and ascertain whether or not he is connected with, paid by, or acting under the inspiration of these gigantic elevator monopolies, which impose what Major Symons correctly characterizes as "excessive and exorbitant charges" on the transportation of cereals, *thereby lowering the price of every bushel of grain raised by Western producers, increasing the price of every barrel of flour used by Eastern consumers, and decreasing the market range within which the breadstuffs of the United States can meet the competition of other wheat-growing countries on equal terms.*

A ship canal which would enable cargoes to be carried direct from Duluth and Chicago to Liverpool and Hamburg would at once cut off these transfer charges, and the saving thereby effected would justify the building of the canal, even if it should cost as much as is estimated by Major Symons, which is $200,000,000. He says truly that to justify the construction of the ship canal, from a business standpoint, the saving in the cost of transportation effected thereby "must at least equal the interest on the cost of the canal plus the annual cost of maintenance and operation." He estimates the cost of construction at $200,000,000, on which the interest at 3 per cent would be $6,000,000, and the cost of maintenance and operation at $2,000,000, a total of $8,000,000 annually.

I consider his estimate too high, but granting that it is correct, the transfer charges on grain handled at Buffalo and grain exported from New York, which charges would be cut off by the ship canal, amounted in 1897 to $7,845,314, almost exactly the sum named by Major Symons as the annual expense, leaving all the saving which would be effected on other classes of traffic and in other ways as clear profit.

WOULD THE CANAL BE USED IF BUILT?

Major Symons, however, iterates and reiterates his opinion that the ship canal would not be used for through business, even if built. He enlarges on the differences in the existing types of lake and ocean craft and adds:

> The pleasing picture of great ships loading with grain, flour, and produce of all kinds, at Chicago, Duluth, etc., and proceeding thence to trans-Atlantic ports, and arriving at these lake ports with foreign cargoes, I can not believe will ever be realized to any great extent, even if a ship canal connecting the Great Lakes with tide water should be built. * * * It would not be a creditable monument to the business management of American public works if the Government should expend $200,000,000 or thereabouts on a ship canal and then find, when it was completed, that it was very little used by the big ships for which it was intended and that the business on it was chiefly transacted in comparatively small vessels, which could be equally well accommodated in a canal of much less size and expense.

This is, at best, simply an expression of an individual opinion, and is, perhaps, best offset by a comparison of some other opinions in a certain celebrated and somewhat similar case, with the results which have been attained.

A HISTORIC PARALLEL.

When De Lesseps proposed to build a canal across the Isthmus of Suez the proposition was derided and ridiculed by practically every engineer in England. They declared that the canal could never be built, because it would cost more money than could be raised; that if built it could not be kept open, since the winds would fill it with the drifting sands of the desert, or the tropical sun would evaporate the water so fast that it would be converted into a streak of salt; and even if built and kept open, it would never be used by a single British ship, because the danger of wreck at points near the entrance and of grounding in the canal itself were so great that no shipowner would risk his craft in such a foolhardy venture.

Yet in less than a dozen years after that canal was opened the same British shipowners, who swore that ships of theirs should never pass through it, were swearing because the canal was too narrow and shallow and small, and petitioning Parliament to build another canal alongside the first one, so that British commerce would not suffer such intolerable delays. The canal has been repeatedly deepened and widened and electric lights enable it to be navigated by night as well as by day. The following table shows in outline the growth in the traffic:

Traffic of Suez Canal.

Year.	Vessels.	Net tonnage.	Traffic receipts.
			Francs.
1870	486	436, 609	5, 159, 327. 22
1880	2, 026	3, 057, 421	39, 840, 487. 64
1890	3, 389	6, 890, 094	66, 984, 000. 22
1896	3, 408	8, 562, 237	79, 569, 994. 31

It seems to be a fairly satisfactory financial investment also, for in 1894, the last year for which I have a detailed statement, after paying all charges, including interest and sinking fund on the bonds, carrying $150,931.60 to the reserve (bringing it up to $1,150,931.60), and appropriating $90,000 for renewals and improvements, there was declared a dividend of 18 per cent, and the receipts were very much larger in 1895 and 1896 than in 1894.

EVOLUTION OF VESSELS.

Major Symons says:

> The rapid change in recent years in the type and size of lake vessels is an important element in determining the rate of deterioration in the value of vessel property. Many vessels which five years ago were in the front rank have had their value reduced to fully one-half owing to the evolution of lake craft.

And yet with the record before him of the marvelous changes which have been wrought in the character of the lake fleet within comparatively few years—from sail to steam, from wood to steel, and from compound to triple and quadruple expansion engines—Major Symons seems utterly unable to see that a still more rapid and remarkable evolution would take place if the Great Lakes were joined to the sea by a ship canal.

Somewhere in Europe—in Denmark, I think it is—there is a steamboat which plies on two lakes between which there is no navigable connection. A track has been built between the two lakes, and there are wheels on the boat adapted to bear its weight and to run on this track. Arrived at the end of navigation on one lake, this boat runs at full speed up onto the track and presently plumps down into the other lake and goes on about its business.

Up in the Lake of the Woods region I found a steamboat, belonging to a lumber concern, which calmly climbs on top of a raft of logs and goes over it when there is no room to go around it, and has made many a trip overland through the woods, distances of 2 to 5 miles, from one lake to another.

If you should take a trip from Buffalo to Duluth on one of the magnificent steamers of the Northern Steamship Company—the *North Land* or the *North West*—you will find the steamer rising as you pass from Lake Erie into the Detroit River and sinking down some 4 or 5 feet again when the deep water of Lake Huron is reached. These boats, like many others on the lakes, have a double bottom, and the letting in or pumping out of 800 or 1,000 tons of water ballast changes them at will from deep-draft lake steamers to light-draft river boats.

The prevailing shallowness of the waters of our Atlantic coast caused the development of a type of boat which was contemptuously referred to by British yachtsmen as a "Yankee skimming dish." But on the occasion of a certain historic yacht race, when Queen Victoria asked, "What is first?" the answer was, "The America, your Majesty." And when she made further inquiry, "And what is second?" the answer was, "May it please your Majesty, there is no second." And the "America's cup" has remained in America's possession from that day to this.

During the civil war gunboats for use in small rivers were made of such light draft that President Lincoln once laughingly said that they could run "wherever the grass was a little damp."

Shipbuilders do not put out vessels adapted for a form of navigation which does not exist, and there are no conditions in existence to-day exactly similar to those which would be created by a ship canal from the lakes to the sea. But shipbuilders have always been ready to build vessels adapted to the needs of any route of navigation, and, in the light of their past achievements, I declare my opinion that whenever the construction of the canal shall be commenced its completion will find vessels ready to navigate it, whether such vessels are in existence to-day or not. I certainly have a very much higher opinion of the ability of American shipbuilders than some of the opponents of the ship canal seem to have.

EFFECT OF THE CANAL ON SHIPBUILDING.

I favor the ship canal because of the changes it will produce—because of the evolutions and the revolutions it will bring about. And I firmly believe that a ship canal would not only produce an evolution in vessel types, but a revolution in vessel construction.

Great Britain made almost as much pig iron in 1860 as the United States made in 1880, but in 1890 we made more pig iron than Great Britain ever made before or since. Our production of Bessemer rails exceeded that of Great Britain in 1879 and ever since.

On Bessemer-steel ingots we surpassed them in 1884, and since 1890 we have led them in the aggregate production of all forms of iron and steel. But up to the present time our great rival continues to hold undisputed supremacy in the building of steel ships, and will continue to do so until we build the ship canal from the lakes to the sea.

Let us take a glimpse at what the lake shipbuilders have done, although cut off from the sea. The first table shows the class, number, and gross tonnage of vessels built and documented on the lakes, the figures being derived from the reports of the Commissioner of Navigation and referring to the fiscal years ending June 30:

Statement showing class, number, and gross tonnage of vessels built and documented on the northern lakes.

Fiscal year.	Sailing vessels.		Steam vessels.		Barges.		Total.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
1870	69	10, 322	49	7. 196	9	3, 289	127	20, 807
1880	48	5, 447	65	14, 306	8	1, 356	121	21, 109
1890	36	12, 803	116	86, 023	12	6, 739	164	105. 565
1891	30	7, 240	123	93. 323	11	6, 853	164	107, 416
1892	41	3, 474	93	34, 129	8	5, 449	142	43, 053
1893	21	9, 277	126	76, 161	11	11, 867	158	97, 305
1894	18	5, 473	71	34, 889	6	429	95	40, 791
1895	22	8, 166	58	26, 516	2	446	82	35, 128
1896	19	21, 825	75	75, 744	14	10, 185	108	107, 754
1897	26	39, 151	43	61, 787	26	12, 722	95	113, 660

An inspection of this table shows the change in the relative amounts of steam and sail tonnage built, the effect of the recent business depression and the recovery therefrom, and the great increase in the average size of lake vessels built in recent years. This last item appears more plainly in the next table, but before submitting that it is of interest to add that during the calendar year 1897 more tonnage was built on the lakes than in all the coast shipyards, lake builders having turned out 120 vessels of 116,937 tons, as against 137 vessels of 115,296 tons for the rest of the United States.

Average gross tonnage of sailing and steam vessels built on the Northern lakes.

Fiscal year.	Sailing vessels.	Steam vessels.
1870	149. 59	146. 85
1880	113. 47	220. 09
1890	355. 65	741. 57
1891	241. 34	758. 72
1892	84. 74	366. 98
1893	441. 46	604. 45
1894	304. 05	491. 39
1895	371. 16	457. 17
1896	1, 148. 69	1, 009. 91
1897	1, 505. 80	1, 436. 91

In this we can see plainly the effect of the deeper channels now available. The late General Poe once said to me:

> It does not make any difference how much water we give these vessel men, they always go with their boats scraping along on the bottom.

I have already given instances of vessels which carry over 6,000 tons, in the discussion of the reduction of rates, so I pass on and submit a table which brings out the great change in the materials used.

Gross tonnage constructed on the Northern lakes, showing material used.

Fiscal year.	Wooden tonnage.	Iron and steel tonnage.	Fiscal year.	Wooden tonnage.	Iron and steel tonnage.
1880	20, 082	2, 817	1889	73, 068	29, 415
1881	67, 673	5, 831	1890	66, 964	38, 602
1882	52, 041	6, 328	1891	49, 428	57, 989
1883	28, 593	45	1892	14, 594	28, 459
1884	26, 233	1, 650	1893	34, 480	62, 825
1885	15, 678	9, 180	1894	20, 851	19, 950
1886	14, 071	4, 221	1895	11, 932	23. 195
1887	46, 475	6, 078	1896	27, 330	80, 424
1888	81, 085	20, 018	1897	13, 281	100, 379

NOTE.—Iron has been used to a very limited extent, the total iron tonnage now afloat being probably not more than 35,000 tons.

Unfortunately, however, vessels are lost as well as launched, and the next table gives us the actual tonnage of the lake fleet for the years named.

Number and gross tonnage of sailing vessels, steam vessels, and barges, respectively, on the Northern Lakes.

Fiscal year.	Sailing vessels.		Steam vessels.		Barges.		Total.	
	Number.	Tons.	Number.	Tons.	Number.	Tons.	Number.	Tons.
1870	1, 699	264, 609	642	142, 973	114	27, 570	2, 455	435, 152
1880	1, 459	304, 932	931	212, 045	165	40, 965	2, 555	557, 942
1890	1, 272	328, 656	1, 527	652, 923	54	13, 910	2, 853	995, 489
1897	993	334, 104	1, 775	977, 235	101	60, 783	2, 869	1, 372, 122

This shows a large increase in the size of the lake fleet, but gives no real idea of the increase in its working power or efficiency; for a steamer is considered two and one-fourth times as efficient as a sail vessel, and the deepening of channels and improvement of dock facilities have certainly raised this relative efficiency another 75 per cent. The following estimate, taken from the report on lake commerce by Mr. Tunell, which has already been referred to, is eminently conservative, for practically all the barges (so called) and the great majority of the craft classified as sailing vessels are towed by the steamers. Only six vessels, proceeding with independent sail power, passed through the locks at St. Marys Falls during the whole season of 1897.

Estimated working power of fleet on the northern lakes.

Year.	Sail and barge, plus steam tonnage multiplied by 3.	Year.	Sail and barge, plus steam tonnage multiplied by 3.
1868	742. 286	1885	1, 351, 516
1870	721, 098	1889	2, 058, 278
1873	881. 311	1890	2, 301, 335
1875	991, 848	1895	2, 912, 855
1880	982, 032	1897	3, 326, 592

The record set forth in the preceding tables is a marvelous one in view of the fact that the lakes are almost entirely shut off from a connection with the sea. Almost, but not quite, for there are Clyde-built vessels on the lakes and lake-built vessels on the ocean which were taken through the Canadian canals along the St. Lawrence in sections and put together again when deep water was reached.

The *Keeweenaw* and *Mackinaw*, two steamers built at the yards of F. W. Wheeler & Co., at West Bay City, Mich., were taken out in this way, the stern sections, containing the engines, going down the lakes backward under their own steam, while the bow sections were towed. Each of these vessels has made two trips around Cape Horn from New York to San Francisco. One of them has since been lost at sea, while the other is still in service on the Pacific.

The insufficiency of the best existing connection with the ocean is well shown by the fact that two tugs recently built by the same firm for ocean service had to be pontooned in order to get them through the Canadian canals.

The whale-back steamer *Colgate Hoyt* (a type originated at Duluth) ran the rapids of the St. Lawrence, being the first steel steamer which ever did so, crossed the Atlantic to Liverpool, went round the Horn, and after a period of service on the Pacific went ashore in a fog and was lost.

Another whale-back steamer, the *City of Everett*, built on the Pacific coast, has just arrived at Charleston, S. C., after a remarkable journey. Sailing from San Francisco last June with a cargo of grain for the starving Hindoos, she brought a cargo of jute to Spain, passing through the Suez Canal on the way, and paying $4,000 for the privilege, the only American merchant steamer to pass that waterway in years. From Spain she brought a cargo of iron ore to Charleston.

If the ship canal were built, the seaboard furnaces of the United States could draw their supplies of ore from the exhaustless ranges of Lake Superior.

Contracts were made at one time with the Detroit Dry Dock and Ship Building Company for steamers to run on Russian rivers and for a ferry steamer to carry the cars of the Trans-Siberian Railway across Lake Baikal, but were canceled, I believe, because of the difficulty of getting them out to the sea.

A lake shipbuilder was the lowest bidder on a vessel for the United States Navy, but was refused the contract because of a clause in the treaty with Great Britain.

Armor plate is forged for Russia at Pittsburg, American steel rails are sold in Australia, and the shrill shriek of American locomotives is heard all around the world.

The coal mines and iron deposits of Great Britain are becoming exhausted, while those of the United States are only beginning to be fairly developed. As a consequence the cost of steel is trending upward in Great Britain and downward in our own country.

The British Engineer of October 18, 1895, said:

> Shipbuilding has already left the Mersey. The United States threaten to build ships for the whole world—and not ships only, but locomotives as well—and to roll rails for humanity in general. The potentialities of the country are enormous.

The building of a ship canal from the lakes to the sea will give the United States the undisputed supremacy in the markets of the world in iron and steel and all their multitudinous products, and speedily and permanently transfer the center of steel shipbuilding from the banks of the Clyde to the shores of the Great Lakes.

THE LESSON OF THE CLYDE.

Everyone has heard of the Clyde and knows that it is the center of the modern steel shipbuilding industry, but not everyone knows that the Clyde is practically an artificial waterway. It was originally a narrow, shallow, crooked stream, so obstructed by sand bars that it is said there were many places where it could be waded at low tide. Not a very promising location for the development of a great shipbuilding industry, it must be admitted, but work was begun and continued, larger revenues being received as the traffic grew with the greater facilities provided, until an aggregate of $70,000,000 has been expended, and the Clyde of to-day is the result, with its banks lined for miles with busy shipyards—one of the busiest hives of human industry upon the face of the earth.

I think the Scotchman had a right to say to the Englishman,

The Thames and the Mersey are good rivers, no doubt, but you have no reason to be proud of them. God gave them to ye, but we made the Clyde ourselves.

EFFECT OF THE SHIP CANAL ON THE AMERICAN MERCHANT MARINE.

I disagree so radically with Major Symons in most of his conclusions that I am glad to find at least one thing in which I agree with him thoroughly, and that is, that a ship canal built by the United States should lie entirely in our own territory. Speaking of the St. Lawrence-Champlain route, he says:

This route has less lockage than the Oswego route, but is, by way of Caughnawaga, 244 miles longer between Lake Erie and the Hudson, which 244 miles is mostly contracted waterway. This route would be in a high degree objectionable from a military standpoint, as it would tend to increase Canadian commerce and reduce American preponderance on the Great Lakes. By building a canal about the Lachine Rapids, the route would be extended to Montreal, which would be the real terminus of the ship canal. * * * It is absurd to suppose that the products of the Northwest destined for foreign ports, having reached to within 10 miles of tidewater at Montreal, would turn to the rightabout and be passed through 350 miles of contracted navigation to another port still farther away from the European markets than it would be at the point of deflection. * * * Canada is making every possible effort to deflect American commerce to its ports.

In connection with the completion of the St. Lawrence canals and improvement of the St. Lawrence River, so that all vessels which can pass the Welland Canal can keep right on down to Montreal, which improvement is expected to be completed in 1899, the Dominion government and Great Britain have, it is stated, granted a subsidy of $500,000 per year to a line of trans-Atlantic steamers to run from Montreal and Quebec. The building of a ship canal by the St. Lawrence route would be still further and more completely opening the doors of the lake commerce to the subsidized fleets of Great Britain and Canada.

In this connection it seems proper to invite attention to a few facts concerning the water-carrying business of the world, which are believed worthy of attention in considering the subject of a ship canal. Upon the Great Lakes there is a total tonnage of the merchant marine of the United States and Canada of 1,483,499. Of this the United States has 1,324,068 tons, or 89 per cent; while Canada has 159,431 tons, or 11 per cent. This shows that the carrying business on the Great Lakes is nearly all in the hands of Americans and conducted in American vessels.

Upon the ocean the reverse is the case. The registered tonnage of the United States on the ocean amounts to 838,187 tons, and the registered tonnage of the United Kingdom to 8,926,000 tons, or more than ten times that of the United States. What can reasonably be expected would be the result of mingling these commercial elements by building a ship canal which would put all our lake ports in direct communication with a foreign port like Montreal, belonging to the United Kingdom, whose fleets, subsidized whenever necessary, do nearly half the ocean carrying business of the world, and which is the foreign market for nearly 75 per cent of our exports?

Can there be any doubt that it would result in placing a very large amount of the carrying business in the hands of Canadians and materially reduce American preponderance on the lakes? This phase of the question is surely worthy of serious consideration before the United States consents to build a canal the resultant damages of which to certain American interests might equal or exceed the benefits to other interests. The 25 principal commercial countries of the world have a registered tonnage of vessels engaged in foreign trade on the ocean of 18,228,826 tons. Of this the United States has 4½ per cent and the United Kingdom has 49 per cent.

THE OTHER SIDE OF THE PICTURE.

It seems strange that one who can see so clearly and present so forcibly the danger to American supremacy on the Great Lakes from a canal in Canadian territory should fail to see what a potent instrument for the reattainment of American supremacy on the high seas could be made of a ship canal through American territory. Being an artificial waterway and wholly under our own control, no foreign ship would ever wet her keel therein except by our permission and under such conditions as we chose to make.

The most rapid reduction of transportation charges might result from throwing this new waterway open to the ships of all nations, but this temporary gain would be far outweighed, in my opinion, by opening it to the passage of American ships alone, using the carrying trade of the lakes—already colossal in its magnitude and increasing by leaps and bounds—as the foundation for the development of the American merchant marine. For I can not believe it possible—it is an insult to American enterprise to believe it possible—that the ships which carry the grain from the heart of the continent to the seaboard will long continue to turn over their cargoes at New York for further carriage on foreign bottoms when before them lies the sea, open and free of toll, a broad highway to all the markets of the world.

During the third of a century which has elapsed since the close of the civil war the mighty forces of our national life have found free play within our own borders. We have completed the occupation of all the lands suited for cultivation without irrigation, and have gridironed the continent with a network of railway lines. But the most prominent characteristic of the latter part of the nineteenth century has been the increase of manufacturing. It may be called distinctively a period of industrial development. This is to be followed, in natural sequence, by an increase of foreign trade. The first decades of the twentieth century seem certain to be a period of commercial expansion. Indeed, the dawn of this new era is already upon us, for in this fiscal year 1898, for the first time in our history, our exports of manufactured articles will exceed our imports of the same class of goods.

It is enough to make an American hang his head in shame that while we have steadily grown in wealth and population, and the amount of our foreign commerce has gone on increasing year by year, the amount carried in our own ships has decreased not only relatively but absolutely, for in 1859 our total imports and exports were $695,557,592, of which $465,741,381, or 66.9 per cent, were carried in American vessels, while in 1897, when our imports and exports had grown to $1,714,829,043, only $189,075,277, or 11 per cent, were so carried.

The Engineering News, of New York, claims that rates on the lakes, with only 16 feet of water available, have become, in many cases, less than rates on the ocean between ports which can accommodate vessels drawing 30 feet.

Those who have studied the matter most deeply believe that steel ships can be built at least as cheaply on the lakes as anywhere else in the world, and the statement just made shows that they can be properly handled after they are built. Would it not be well, therefore, both for our national interests and the progress of humanity in general, to open a pathway to the sea and give the ability in invention, the skill in construction, and the genius for organization, which have wrought such results as these within the narrow limits of the lakes, a broader field in which to come to full fruition? Can there be any doubt of the result? I have none. Our ships would be as much sought after by other nations as were the clipper ships in the former days when navies were built of oak instead of steel. The bulk of our imports and exports would be carried in American ships, and the $350,000,000 a year now paid to foreign shipowners would be mostly paid instead to citizens of the United States, and our flag would once more become a familiar object in ports both far and near, while our national wealth would be increased annually by a liberal share of the carrying charges on the commerce of the world.

FACILITIES FOR TRANSFER.

Much of the credit for the low rates on the lakes is given to the remarkable transfer facilities with which lake ports have been equipped. These facilities are unquestionably admirable. Wheat is spouted from elevators into the holds of vessels at an average rate of 1,000 bushels per minute. The Delaware and Lackawanna trestle at Buffalo put 5,127 net tons of anthracite coal into the *Zenith City* in four hours. A vessel was recently loaded at Cleveland with 5,176 tons of soft coal in ten and one-half hours by the use of one of the new car-dumping machines; the total cost of the transfer, including labor, fuel, oil, and waste, being only $13, or one-fourth cent per ton.

At one of the yards in Milwaukee two vessels, whose cargoes of coal aggregated 7,776 tons, were unloaded in twelve hours. At Two Harbors, Minn., 3,028 tons of hard ore were loaded in seventy minutes, and vessels frequently load at that port with 3,500 to 4,000 tons of ore and depart within two hours after arrival. Fifteen years ago 15 or 16 round trips from the head of Lake Superior to Cleveland was considered a good season's work. Now nothing less than 22 is satisfactory.

If we are to believe Major Symons, however, transfer facilities in the harbor of New York are so poor that steamers plying through a ship canal would be detained more days in the harbor of the metropolis than they now spend hours in ports on the lakes. This statement, like some we see in the papers, is "important if true." Based on the assumption of such extraordinary delays in port, Major Symons gives the following estimate of the cost of transportation between Buffalo and New York by different methods:

Major Symons's estimate of cost of transportation from Buffalo to New York by different methods.

	Per bushel.	Per ton.
By ship canal:	Cents.	
In 5,000-ton vessels	2.81	$0.94
In 7,000-ton vessels	2.28	.76
By Erie Canal in its present condition:		
With four-boat fleets	3.81	1.27
With six-boat fleets	3.56	1.17
By Erie Canal as it is being improved:		
With four-boat fleets	2.70	.90
With six-boat fleets	2.57	.86
By 1,500-ton barge canal:		
Business conducted with four-boat fleets, as at present	2.07	.69
With semi-independent motive power and consorts	2.01	.67

This point is discussed by Mr. Joseph Mayer in a paper read before the American Society of Civil Engineers, March 2, 1898. He says:

> There is a very serious error in Major Symons's estimate of the cost of transportation from Chicago to New York by a steamer of either 16 or 20 feet draft, through

a canal 24 feet deep, between Buffalo and New York. He obtains the cost by adding to the present freight rates on the lakes from Chicago to Buffalo his calculated cost from Buffalo to New York. * * * It is reasonable to assume that if a ship canal existed facilities for loading and unloading would be provided in New York at least as good as those existing in Buffalo. The only additional time required for the round trip from Chicago to New York and back, instead of to Buffalo and back, would be the time required for going and coming from Buffalo to New York. This time, with an average speed in canal and canalized river of 4 miles, and a speed of 13 miles in lake and river, would be seven days twelve hours, and not twenty-two days, as Major Symons estimates.

This estimate is undoubtedly much nearer the truth than is the assumption of Major Symons, although it is still very conservative, for there are many lake steamers which maintain an average speed of 16 miles in open navigation, while the average speed of all the vessels which used the Suez canal in 1896 was 5.36 miles per hour. When this canal was first opened the passage occupied about three days, but when improvements now under way are completed it is expected that a speed of 7 miles per hour will be allowed, which will reduce the time of transit to fourteen hours.

But, using the conservative basis of Mr. Mayer, the cost per bushel from Buffalo to New York is found to be 1.17 and 1.41 cents for 7,000-ton and 5,000-ton vessels, respectively, instead of 2.28 cents and 2.81 cents, as estimated by Major Symons.

ACTUAL CONDITIONS IN NEW YORK HARBOR.

It is utterly absurd to suppose that men who are accustomed to the quick dispatch of the lakes would be content to let their vessels lie in the harbor of New York for ten or twelve days—as long a time as would be necessary to cross the ocean and discharge cargo at Liverpool. They might do it once, but it would never happen again. But it does not seem to have occurred to either Major Symons or Mr. Mayer to investigate the facts and learn the results actually attained in handling cargoes in New York Harbor. This has been done, however, by Mr. Chauncey N. Dutton, inventor of the Dutton pneumatic canal lock, to whose courtesy I am indebted for the privilege of presenting extracts form letters received by him.

A letter from the manager of two great steamship lines, dated November 30, 1897, says:

The *B*——— is a steamer of 5,641 tons gross, or 2,957 tons net capacity. We have frequently docked, unloaded, loaded, coaled, and sailed this steamer in less than twenty-four hours. For instance, she arrived April 10, 1894, at 6.13 p. m. and sailed at 4.48 p. m. on the 11th. Unloaded 260 tons weight, 633 tons measurement; loaded 1,046 tons weight, or 2,425 measurement, and 950 tons coal. Total pieces of freight, 23,193. There was a severe storm during the whole time, which retarded the work.

Arrived noon, February 27, 1894, sailed noon, February 28. Unloaded 205 tons weight, 590 tons measure; loaded 1,408 weight, 3,489 measure, and 1,025 tons coal. Total packages, 35,534.

Steamship *N*———, docked 8.35 a. m. November 17, 1896, sailed 10 a. m. November 18. Handled 5,000 tons cargo, 47,200 pieces.

No comparison is possible between the loading of a miscellaneous cargo on an ocean steamer and bulk cargo on a lake steamer, and I am quite certain that with the most modern appliances and the best practice on the Great Lakes they could not approach the rapidity with which we can handle an ordinary general cargo. We have given you information which we do not ordinarily make public, so I would be obliged if you did not use the names of our ships.

A letter from Mr. Emil L. Boas, manager of the Hamburg-American Line, under date of November 27, 1897, states that on a recent occasion the steamer *Pennsylvania*, of that line, "brought in 10,000 tons and took out 17,000 tons (measurement). The work of unloading and reloading was completed in ten days and could have been done in eight days."

A letter from Mr. Edwin Hawley, assistant general traffic manager of the Morgan Steamship Line, under date of December 8, 1897, says:

> West-bound cargoes consist of provisions, furniture, dry goods, soap, tobacco, carpets, matting, boots and shoes, hats, hardware, steel rails, and machinery of all kinds.
>
> East-bound cargoes consist of dried fruit, canned goods, wool, cotton, wine, molasses, copper bullion, copper matte, green and dry hides, and general merchandise. All this freight must be so stowed that it can not shift in heavy weather. The following table gives the record of our boats for November, 1896:

Steamer.	November.		Hours.		Tons discharged.	Tons loaded.	Tons coal.	Total tons handled.	Total hours.
	Arrived.	Departed.	Unloading.	Reloading.					
El Mar	2	7	16	10	2,638	1,684	492	4.814	26
El Sol	4	9	16	9	2,216	1,620	645	4,481	25
Chalmette	6	10	17	10	2,292	1,508	484	4,284	27
El Rio	8	12	16	19	2.850	1,820	670	5,340	35
El Dorado	10	14	17	21	2,433	1,470	527	4,450	38
Excelsior	12	17	15	17	2,251	1,492	520	4,263	32
El Paso	14	19	12	17	2.517	1,415	544	4,476	39
El Norte	16	22	18	22	2,866	1,070	782	4,718	40
El Monte	18	24	12	17	2,354	817	559	3,730	29
El Sud	20	26	16	19	2,767	1,076	738	4,581	35
El Mar	23	28	14	24	2.413	1,288	525	4,226	39
El Sol	24	[1]1	13	17	2.417	637	799	3,852	30

[1] December.

A letter from Mr. H. A. Bourne, president Old Dominion Steamship Company, dated November 19, 1897, states that a steamer of that line—

> arriving at 4 p. m. Friday leaves at 4 p. m. Saturday. The time required for discharging and loading depends very much on room on the pier to distribute cargoes and on the character of freight handled. The steamship *Princess Anne*, with a bulk capacity of 150,000 feet, arriving full, can be discharged, coaled, and loaded full again in twenty-four hours. To do this, the dock must not be choked with freight. In the busy season we handle 2,000 tons of freight per day—1,000 in, 1,000 out.
>
> I think the great advantage on the lakes is that cargoes are not so much made up of miscellaneous freight, whereas cargoes at New York are varied—merchandise, dry goods, groceries, machinery, agricultural implements, pig iron, lead, etc. My own judgment is that we can handle freight as expeditiously here in New York as anywhere else in the world if we have the room, but wharf rents are exorbitant, and it is difficult to obtain room even by paying these very high prices.

A second letter from Mr. Bourne, dated November 29, says:

> We are running between this port and Norfolk, Va., on a regular schedule, the steamers *Princess Anne*, 3,100 tons; the *Jamestown*, 3,000 tons; the *Yorktown*, 3,000 tons, and the *Guyandotte*, 2,400 tons. *They average about 75 round trips a year each.* We rarely ever lay up more than two weeks in the year, and endeavor to keep our ships in good condition while they are running.

In the light of these statements of actual results, I can see no foundation whatever for Major Symons's assumption of extraordinary delays in port. And even if it be found most profitable to transfer from lake steamers to ocean steamers at the seaboard, it is perfectly certain that proper facilities for such transfer will be provided therefor, either in New York harbor or elsewhere.

ANOTHER ERROR POINTED OUT.

Mr. Mayer points out still another error in Major Symons's premises, which being corrected makes a further and material modification of his figures. The present cost of transportation by water for a bushel of wheat from Chicago to Liverpool is, according to Major Symons:

	Cents.
Chicago to Buffalo	1.37
Transfer charge, Buffalo	1.36
Buffalo to New York	3.18
Transfer charge, New York	1.70
New York to Liverpool	5.23
Chicago to Liverpool[1]	12.84

As to this statement Mr. Mayer says:

> The items given as transfer charges in Buffalo and New York are only a part of the cost caused by these transfers. A ship loading in Chicago and unloading in Liverpool would, in comparison with the present ship between Chicago and Buffalo, the canal boats between Buffalo and New York, and the ship between New York and Liverpool, save all the time spent for transfers in Buffalo and New York. It would therefore save half the time spent in port by the lake ship and ocean vessel and the whole time spent in port by the canal boat.
>
> The canal boat spends twelve days out of thirty in port in the active season, and about one-third of its expenses are incurred during this time. The ocean vessel and lake vessel spend, respectively, say, 0.3 and 0.4 of their time in port, and about one-quarter and one-third of their expenses are incurred while there. Therefore one-sixth of the cost from Chicago to Buffalo, one-third of the cost from Buffalo to New York, and one-eighth of the cost from New York to Liverpool are chargeable to costs of transfer in Buffalo and New York. The present costs due to transfers in Buffalo and New York are therefore as follows, in cents per bushel of wheat:
>
> | | |
> |---|---|
> | Transfer cost, Buffalo (one-sixth of 1.37) + 1.36 + (one-sixth of 3.18) | 2.12 |
> | Transfer cost, New York (one-sixth of 3.18) + 1.70 + (one-eighth of 5.23) | 2.88 |
> | Total cost of transfer, Buffalo and New York | 5.00 |
>
> The revised estimate in detail of present costs, Chicago to Livepool, in cents per bushel of wheat, is therefore as follows:
>
> | | Cents. |
> |---|---|
> | Chicago to Buffalo | 1.14 |
> | Transfer in Buffalo | 2.12 |
> | Buffalo to New York | 2.12 |
> | Transfer in New York | 2.88 |
> | New York to Liverpool | 4.58 |
> | Total, Chicago to Liverpool | 12.84 |

The CHAIRMAN. What are the charges in New York City?

Mr. THOMPSON. Transfer in New York, 2.88 cents per bushel. It should be noted, however, that this is the cost due to transfer, including loss of time by vessels, rather than the charge made for transfer.

The CHAIRMAN. When was that report which you have in your hand made?

Mr. THOMPSON. It is not a report, technically speaking, but a copy of the proceedings of the American Society of Civil Engineers, containing a paper by Mr. Joseph Mayer on "The economic depth for canals of large traffic."

Mr. MORRIS. Is not that twice as much as it costs to take a bushel of wheat from Duluth to Buffalo?

Mr. THOMPSON. Yes, sir. During 1897 the rate from Duluth to Buffalo was as low as 1 cent per bushel, and during the greater part of the season was 1½ cents or less. The average price from Chicago to Buffalo for the past five years, according to Major Symons, has been

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[1] There are a number of discrepancies in the statements of Major Symons in different parts of his report, due to arithmetical errors; and the same criticism is to be made on Mr. Mayer. The figures here used are taken from the detailed tables of Major Symons's report.

1.37 cents, or, applying Mr. Mayer's corrections, 1.14 cents. We of the West are willing to be taxed to carry on this Government and supply its needs both in time of peace and in time of war. We will give millions for defense if necessary, but we do not consider that we owe any allegiance whatever to the elevator rings in Buffalo and New York, and we pay tribute to them under protest.

Mr. MORRIS. What does it cost to take a bushel of wheat from Duluth to Liverpool?

Mr. THOMPSON. From Chicago to Liverpool, 12.84 cents. It is practically the same thing from Duluth.

Mr. MORRIS. Now, if you had deep water all the way from Duluth to New York, for what price could you take a bushel of wheat to Liverpool?

Mr. THOMPSON. We could cut that rate in two. Using the rate for ocean navigation given by Major Symons, the cost would be 7 cents per bushel. But that is the average rate for nine years. Rates during recent years have been much lower, and, taking the average ocean rate for the last three of those years, the price would be 6.14 cents per bushel. Give us a canal properly built, of proper depth and width, and with modern appliances—not the old-fashioned locks, which were invented about the time Columbus discovered America, and have not been improved much since, but the hydraulic lock, which is not an experiment, or the new pneumatic lock invented by Mr. Dutton, which, in my personal judgment, is destined to do as much for inland navigation as the invention of the locomotive did for land transportation—and we can put wheat through from Chicago or Duluth to Liverpool at not to exceed 6 cents per bushel, and ultimately bring the price down to 5.

Mr. BISHOP. That would mean free water transportation?

Mr. THOMPSON. Certainly.

Mr. BISHOP. It would not take into account the investment at all?

Mr. THOMPSON. A saving of 6 cents per bushel, which would accrue with a rate of 6.84 cents, would mean $2 per ton. Major Symons concedes a tonnage of 24,000,000 tons annually, on which the saving would be $48,000,000. On an estimated cost of $200,000,000 he estimates interest and maintenance at $8,000,000. So the direct saving which would result would pay interest and cost of maintenance and leave a profit of $40,000,000 annually, or 25 per cent, which would seem to me a very fair return on the investment.

But this does not represent a tithe of the benefits which would result. It is conceded that on articles which are largely exported the price on the exported surplus fixes the price in the home market, the price in the home market being equal to the foreign price minus the cost of transportation.

The production in 1897 of the three principal cereals—wheat, corn, and oats—was, in round numbers, 3,200,000,000 bushels. A decrease of 6 cents per bushel in the cost of transportation of the exported surplus of these cereals, would, in accordance with the principle I have stated, have made an increase in the value of the total crop of $192,000,000. Some of the exports, of course, were from the Pacific coast, and would be affected only in a slight degree, if at all, by the ship canal, but I have no doubt whatever that the ship canal would increase the national wealth every year by an amount far in excess of its total cost.

Mr. BALL. What is the distance from New York to Liverpool?

Mr. THOMPSON. Three thousand four hundred and forty miles.

Mr. BALL. And how far is it from Chicago to Buffalo?

Mr. THOMPSON. Nine hundred miles.

Mr. Ball. Could these ocean ships go in and transport that grain as cheaply as the lake vessels do?

Mr. Thompson. That touches one of the points on which Major Symons lays great stress. It is undoubtedly true, as he claims, that lake vessels, as now constructed, are not adapted to ocean navigation, and that ocean vessels, because of their greater cost, could not compete with lake vessels in carriage on the lakes. But the real question is, Can ocean vessels enter the lakes and carry cargoes across the Atlantic more cheaply than can be done by present methods, which involve several hundred miles of shallow canal navigation and two transfers? And to that question I unhesitatingly answer yes.

Turning again to the revised estimate of the present cost of transportation from Chicago to Liverpool, as given by Mr. Mayer, we find that it divides up as follows:

	Miles.	Cents.
Chicago to Buffalo	900	1.14
New York to Liverpool	3,440	4.58
Total	4,340	5.72
Transfer in Buffalo		2.12
Buffalo to New York	472	2.12
Transfer in New York		2.88
Total	472	7.12

That is to say, it costs 1.4 cents more per bushel to get the grain 472 miles across the State of New York than it costs for 4,340 miles of deep-water carriage on lake and ocean. More than 55 per cent of the total cost is used up in transportation over less than 10 per cent of the distance. The ocean vessel will save the whole cost due to transfers, which are 2.12+2.88=5 cents per bushel, and can certainly carry through a ship Canal for less than small boats can carry through the present Erie Canal, for it is considered that within reasonable limits the efficiency of a navigable channel increases as the cube of the depth.

It must be remembered, too, that the ocean vessel would have a great advantage over the lake vessel under existing conditions in that it could be kept in service the whole year, while the lake vessel is necessarily tied up for from four to five months annually. The lake vessel, therefore, in order to be operated at a profit, must receive rates during the season of navigation sufficiently high to compensate for these months of enforced idleness, while the ocean vessel, with the coming of winter on the lakes, could pass out through the canal and carry cargoes during the remainder of the year in waters which are never closed by ice. Major Symons says:

> One of the benefits claimed for a ship canal by some of its advocates is that it would enable lake ships to go to sea and engage in the transportation business at sea during the closed winter period on the lakes. This is doubly impracticable, from the fact that the lake vessels are not fitted for service at sea, either in hull or machinery, and would be particularly deficient in winter when the North Atlantic requires craft of the stanchest character, and also from the fact that the business field they could enter would be fully occupied by vessels engaged in it all the year round.

It is certain that all lake vessels would need some changes to fit them for service at sea, as for instance the provision of surface-condensers so that sea water could be used in the boilers, and there are no doubt many vessels on the lakes which could not be fitted to operate profitably or safely on the ocean. But vessels which left the lakes for the winter would not necessarily be confined to the North Atlantic. There is nothing that I can see to hinder those which did not care to meet the storms of that region from seeking trade under sunny skies and in the quiet waters of Southern seas.

According to Lloyd's Register in the years from 1889 to 1895, inclusive, there were added to the ocean fleets of the world a total of 7,418 vessels having a capacity of 9,537,162 tons, an average of 1,060 vessels and 1,362,452 tons annually.

This new construction was, of course, partly to replace vessels which had been wrecked or put out of commission for various reasons, but that it was not wholly on this account is shown by the following table. The column headed "Potential tonnage" is obtained by adding to the sail tonnage the steam tonnage, multiplied by 4, a steam vessel being considered four times as efficient on the ocean as a sail vessel.

Total number and tonnage of steam vessels (over 100 tons) and sail vessels (over 50 tons) in the world, and potential tonnage of entire fleet.

[Recorded by Bureau Veritas.]

Year.	Steam (over 100 tons).		Sail (over 50 tons).		Potential tonnage.
	Number.	Gross tons.	Number.	Gross tons.	
1886	8,547	10,403,958	42,545	12,571,384	39,840,984
1887	8,718	10,632,722	41,282	12,174,016	39,992,456
1888	8,835	11,045,937	39,667	11,636,289	40,643,277
1889	9,256	11,913,371	37,567	11,081,197	42,073,381
1890	9.638	12,825,709	33,879	10,540,051	43,687,039
1891	10,103	13,805,028	31,666	10,217,909	45,707,485
1892	10,362	14,380,036	30,711	10,093,749	47,000,401
1893	10,629	15,134,436	29,756	9,829,063	48,528,319
1894	10,744	15,657 124	29,333	9,547,747	49,526,847
1895	11,155	17,089,596	29,348	9,135,560	51,179,660

From which we see that the net increase of the potential tonnage has been 11,338,676 tons or 28.4 per cent, or an average of 1,133,868 tons annually. It follows, then, that the capitalists of the world, besides replacing all tonnage lost and retired from service, have invested in the ten years named between $160,000,000 and $170,000,000 in additional tonnage, all of which had to enter "a field already fully occupied"—unless, and this seems to me more probable—Major Symons is mistaken. Increased transportation facilities beget increased traffic, and whether lake vessels would, or could, go to the ocean or not, it is certain that ocean vessels could, and would, come to the lakes, and to the benefit of all concerned—except the elevator monopolies of Buffalo and New York.

SHIP CANAL VS. BARGE CANAL.

I have endeavored to show the saving in cost of transportation which will be effected by a ship canal as compared with present methods and facilities, but it is essential to devote a little time to a discussion of the comparative advantages of the ship canal and the barge canal recommended by Major Symons. He favors a canal, with a depth of 12 feet, on the line of the present Erie Canal, or a slight modification thereof, and estimates its cost at $50,000,000. This would be capable of passing barges carrying 1,500 tons, which could, if necessary, navigate the lakes and reach coastwise points some distance north and south of New York. He gives an interesting study of the transportation of coal between domestic ports on the Atlantic coast, showing that while prior to 1880 most of this business was done in sailing vessels, now more than 90 per cent of all coal shipped goes in barges towed by tugs.

He argues that the fact that such barges could run past Buffalo and New York would operate to reduce transfer charges at those points to what he considers reasonable rates, say from 1.36 cents to three-fourths of a cent at Buffalo. But granting that such a reduction would be made at Buffalo, and even that a similar one would result at New York on coastwise business, there still remains the export trade which is too important to be neglected. Major Symons thinks that the same reduction would be made on both classes of business, but that does not follow. An elevator monopoly which is strong enough to compel the great railway lines terminating on the harbor of New York to make on grain "an additional charge of 1 cent per bushel if delivered to ocean vessels," after they had "constructed large and expensive elevators, fully adapted to the requirements of this business" (See Major Symons's report), would be apt to do pretty much as it pleased with any barge line which could be operated on a capital of $50,000.

What is needed is not a reduction of these transfer charges, but their destruction. These commercial concerns require, not palliative poultices, but a knife which will utterly extirpate them—and this, as is acknowledged by Major Symons, the ship canal would furnish. Major Symons, however, evidently expects that the barge canal would only reduce the tolls, not abolish them, for in the lowest cost of transportation given by him through such canal he bases his figures on "tolls at Buffalo reduced to three-fourths of a cent per bushel."

This figure depends also on the further assumption—

> that the canals will be used and business transacted on them in a thoroughly businesslike and broad-gauge manner, which would require the abrogation of the very unwise and absurd restriction which New York now places on the canal by limiting its use to corporations with $50,000 or less capital.

I do not see what reason he has to hope for any such result, for I am utterly unable to see how doubling the depth of the Erie Canal would increase the wisdom of the New York legislature in any degree whatever.

A fundamental objection to the barge canal is that it is not possible to use it in any but one way, and that not indisputably the best way. Barges are used on the lakes and in the coastwise coal traffic, but many companies with ample capital to provide vessels of any class desired depend on fleets of single steamers.

A fundamental advantage of the ship canal is that it opens the way for boats of any size or class, running either singly or in combinations of any kind, making it possible for American capital, enterprise, and ingenuity to work out the boats and the methods adapted to traffic of every class—local or through, heavy or light, in bulk or separate packages.

And while a bushel of wheat is a convenient subject for a comparative study of different transportation methods, and grain, coal, and ore can be transferred at moderate cost and slight risk of damage, there are many classes of goods in which the damage inseparable from transfer constitutes a serious item of cost.

In 1893 Mr. O. A. Thorpe, of Chicago, brought a small Norwegian steamer through the Canadian canals to Chicago, loaded largely with fish in wooden packages. Small as the steamer was, two-thirds of her cargo had to be lightered in order to pass the St. Lawrence canals. Speaking of the matter to me, Mr. Thorpe said that he would be glad to embark in the business permanently *if he could only be sure of profits as great as the cost of the extra cooperage necessitated by these transfers.*

Assuming Buffalo charges reduced to three-fourths of a cent per bushel, common-sense business methods in use, etc., Major Symons estimates the practical attainable cost of shipping wheat from Chicago to Liverpool as follows:

	Per bushel.	Per ton.
	Cents.	
By ship canal	10.80	$3.60
By suggested barge canal	9.99	3.33

This gives an apparent advantage of 27 cents per ton to the barge canal. But by eliminating the results of the errors pointed out by Mr. Mayer the figures will stand as follows:

	Per bushel.	Per ton.
	Cents.	
By ship canal	7.00	$2.33
By barge canal	9.99	3.33

showing an actual advantage of $1 per ton in favor of the ship canal as compared with the barge canal, or $24,000,000 per year on the cost and traffic estimated by Major Symons.

A barge canal would not avail to prevent the threatened diversion of American traffic to Canadian ports. During the coming season of navigation lines of steamers are to run from Chicago and Duluth to Parry Sound, on Georgian Bay, in connection with the Ottawa, Arnprior and Parry Sound Railway. The distances by lake to Parry Sound are only about 60 per cent of the distances to Buffalo; the distance by rail from Parry Sound to tide water at Montreal is practically the same as from Buffalo to New York, and Montreal is 350 miles nearer to Liverpool than New York. Under such conditions the new line ought to be able to develop a large traffic at the expense of the American routes. In 1899 the St. Lawrence canals will be completed so that vessels drawing 14 feet can pass through.

This will enable lake vessels of all but the largest class to go alongside ocean steamships at Montreal, making but one transfer between Chicago or Duluth and Liverpool, while the smaller class of ocean vessels can go direct to the lake ports and carry their cargoes through with no transfer at all.

There is a strong probability that the near future will see the construction of the Montreal, Ottawa and Georgian Bay Canal. This will have a depth of not less than 15 feet, and may be made 20 feet deep. By this new route—on which there will be only 30 miles of actual canal, the rest being lake and slack-watered river—*the distance from Chicago to Montreal and ocean navigation will be only 20 miles greater than the distance to Buffalo, which is 500 miles from the sea.*

A blind man can see what a diversion of traffic that would make, for there is no sentiment in trade. Traffic seeks the cheapest route of transportation just as water runs downhill, and an advantage of one-fourth cent per bushel will turn the tide of trade from the Hudson to the St. Lawrence.

The barge canal, if built, would be outgrown in a short time, and the money expended in its construction would be wasted, since the ship canal, by which it would be superseded, would necessarily be built on a radically different route. There are few things more remarkable than the record of the rapid and continuous growth of lake commerce, and, as we have no way to judge the future but by the past, it is well to take a glance at this record.

GROWTH OF LAKE COMMERCE.

In 1840, when Congress was debating a bill making a grant of public lands to the State of Michigan for the purpose of building locks at the outlet of Lake Superior, Henry Clay denounced it as a "scheme for squandering the public money on a chimera beyond the remotest bounds of settlement. if not in the moon."

In 1853, when the project was under discussion in the Michigan legislature, Mr. E. B. Ward, of Detroit, who was one of the most energetic and farsighted business men of his day, wrote to a friend that he was jeopardizing the whole enterprise by advocating "locks of such enormous dimensions, which will not be needed during the present century, if ever."

How far has history justified these pessimistic prophecies? The first locks (of the "enormous dimensions" of 350 feet in length and 11½ feet depth of water) were opened in 1855, supplemented in 1881 by a lock 515 feet long, 80 feet wide, and 17 feet deep, and blown up and superseded in 1896 by another 800 feet long, 100 feet wide, and 21 feet deep, while meantime still another, 900 feet long, 60 feet wide, and of the same depth (21 feet) had been built upon the Canadian side of the river. So that four years before the close of the century the little locks of 1855, which seemed so enormous to Mr. Ward, have been replaced by three really enormous locks, each of which is larger than any other to be found in all the world, except the two which keep it company.

Some years ago I stood at the "Soo" with the late Gen. O. M. Poe, who was in charge of the improvements at that point, and who has often appeared before this committee. On one side was the lock of 1881, with the great ships passing through; on the other yawned the huge excavation in which the masons were busily piling up great blocks of stone in the walls of the new lock. General Poe said to me, and the surroundings made his words doubly impressive:

> The way this lake commerce grows is a wonder. It continually outruns every provision made for it. I have watched its increase for thirty-five years, but neither I nor anyone else I know has been able to expand in ideas at the same rate. The wildest expectations of one year seem absurdly tame by the side of the actual facts of the next.

"I was told to make this new lock," he continued, "with 21 feet of water on its miter sill, but I was not told what point to measure from. I took the average of the stages of low water, but I made a serious mistake in doing so. It is the chief regret of my life," and he said this with intense earnestness, "it is the chief regret of my life that I did not put it 21 feet below the lowest stage of water ever recorded. When this lock was opened," pointing as he spoke to the lock of 1881—

> the engineers thought that they had solved the question of a navigable connection with Lake Superior for all time to come. But it was hardly finished before it was outgrown, and I can see that the new one will be outgrown also. I am an old man now, and it will not happen until my accounts are made up, but if you live out your days you will see this magnificent lock, which is now the finest in the world, blown out with dynamite, as the little locks of 1855 were, to make room for one with not less than 26 feet, perhaps 30 feet, of water on its sill.

These are impressive words, and coming, as they do, from an able engineer like General Poe, near the close of a lifetime spent in a study of lake commerce and its needs, they are worthy of the most careful consideration.

In 1855, the year the first locks at the "Soo" were opened, the registered tonnage was 106,296 tons. The half-million mark was passed in 1863 (507,434 tons), the million mark in 1873 (1,204,446 tons), and the two million mark in 1881, the year in which the Government took control of the canal, since which time the growth of commerce at this point is shown in the following table:

Commerce of St. Marys Falls Canal.

Year.	Vessels.	Registered tonnage.	Total freight, net tons.
1881	4, 004	2, 092, 757	1, 567, 741
1882	4, 774	2, 468, 088	2, 029, 521
1883	4, 315	2, 042, 259	2, 267, 105
1884	5, 689	2, 997, 837	2, 874, 557
1885	5, 380	3, 035, 937	3, 256, 628
1886	7, 424	4, 219, 397	4, 527, 759
1887	9, 355	4, 897, 598	5, 494, 649
1888	7, 803	5, 130, 959	6, 411, 423
1889	9, 579	7, 221, 935	7, 516, 022
1890	10, 557	8, 454, 435	9, 041, 213
1891	10, 191	8, 400, 685	8, 888, 759
1892	12, 580	10, 647, 203	11, 214, 333
1893	12, 008	8, 949, 754	10, 796, 572
1894	14, 491	13, 110, 366	13, 195, 860
1895	17, 956	16, 806, 781	15, 062, 580
1896	18, 615	17, 249, 418	16, 239, 061
1897	17, 171	17, 619, 933	18, 982, 755

SOME INTERESTING COMPARISONS.

The meaning of figures is sometimes made more apparent by comparison than when they are presented alone. Duluth, at the head of Lake Superior, is a young city and a little city, but its traffic compares very well with that of the Suez Canal.

1897.

	Vessels.	Tonnage.
Duluth	5, 143	7, 526, 424
Suez Canal	2, 986	7, 898, 981

Chicago, at the head of Lake Michigan, is not as large as London yet, but apparently does some business. The figures for London do not include coastwise traffic, but represent the tonnage of arrivals and clearances in foreign trade only.

Arrivals and clearances:	Tonnage.
Chicago, 1897	14, 394, 766
London, 1896	15, 582, 195

The freight tonnage passing through the St. Mary's Falls Canal in 1897 was nearly as great as the registered tonnage of all the vessels which cleared from all the seaports of the United States for foreign countries the same year, 1897.

St. Mary's Falls Canal, freight tons	18, 982, 755
All United States seaports, clearances, registered tons	19, 878, 405

The vessels—American only—which cleared from lake ports in 1896 had a total registered tonnage of 53,265,572 tons. This exceeded the registered tonnage of the combined entries and clearances for the fiscal year 1896 at all the seaports of the United States—Atlantic, Gulf, and Pacific—by 17,993,824 tons.

A still more striking comparison is made by taking the clearances at some of the principal ports of the world, as follows, the figures being furnished by the Bureau of Statistics, Treasury Department, and referring throughout to the calendar year 1896:

	Clearances (registered tons).	
London	6,588,910	
Liverpool	5,239,510	
Cardiff	6,947,224	
Tyne ports	4,944,316	
Glasgow	1,902,330	
Principal British ports		25,622,290
Havre	2,298,402	
Dunkirk	1,173,649	
Marseilles	4,099,405	
Principal French ports		7,571,456
Antwerp, principal Belgian port		5,883,829
New York	6,943,835	
Boston	1,634,120	
Philadelphia	1,411,404	
Baltimore	1,519,397	
New Orleans	1,319,716	
San Francisco	1,186,618	
Principal American seaports		14,015,090
Grand total		53,092,665
Great Lakes ports, American vessels only		53,265,572

And it must be remembered that navigation on the lakes lasts only eight months, while the other ports named are open the whole year through. Such a commerce as that, Mr. Chairman, has a right to speak, and when it speaks it is entitled to be heard.

A LOOK AHEAD.

And the commerce of the lakes has not reached the climax of its development; we have scarcely seen its beginning. In 1890 only a little more than one-fifth of the land in Minnesota had passed under cultivation in any form; in Nebraska, a little more than one-fourth; in the Dakotas, less than one-eighth; while even in Iowa nearly one-third of the total area was still unconquered by scythe or plow.

Even in the older settled States lying to the east of those named, increase of production will follow the substitution of "intensive cultivation" for the "extensive occupation" which has hitherto been the rule, while westward are millions of acres of fertile lands, barren now because arid, but only waiting the magic touch of irrigation to blossom into fruitfulness.

Northward, across the boundary line, lies the almost illimitable area of the Canadian Northwest, in which, throughout a vast region stretching away beyond the Saskatchewan to the valleys of the Peace, the Liard, and the Mackenzie, there is to be found every condition of soil and climate needed for the support of a great population—every resource of forest, field, and mine to furnish the physical foundation for a mighty empire.

To the people of the Eastern seaboard, the city of Duluth, which Mr. Morris and myself call "home," no doubt seems far away in the frozen Northwest. But the limit of the profitable cultivation of wheat lies at least 1,600 miles beyond Duluth. It has been raised successfully for many years at Fort Simpson, a post of the Hudson Bay Company, at the junction of the Liard and Mackenzie rivers, near the intersection of longitude 122° west and latitude 62° north. If a circle be drawn upon a map of North America, with this distance as a radius and Duluth as its center, it will include within its sweep a portion of the Arctic Sea upon the north, half of the Gulf of Mexico upon the south, and all of Washington and most of California upon the west, touch Newfoundland upon the east, and fall into the Atlantic full 500 miles beyond the city of New York.

Rye and oats can be grown at least 200 miles still farther north, while the possible limit of the ripening of barley and potatoes lies beyond the Arctic Circle, fully 2,000 miles northwest of Duluth. "Where wheat will grow, there man will go," and, in fact, the "going" has already commenced, a tide of emigration not only from overcrowded Europe, but also from the States of our own Union, having set in toward the unoccupied lands of the Canadian Northwest. It is only—

> The first low wash of waves, where yet
> Shall roll a human sea—

but the early years of the coming century will see a mighty movement of population into "the great lone land" like that which peopled the prairies of our Western States. And in obedience to the irresistible law of commercial gravitation, the surplus products of the whole Northwest, Canadian and American alike, will seek the markets of Europe across the waters of the Great Lakes.

No gift of prophecy is needed to foresee a colossal increase of lake traffic as a consequence of the development of the Northwest, although we can probably no more comprehend the full extent of that development and the ultimate magnitude of the consequent traffic than Henry Clay, in 1840, could conceive of conditions as we see them now. But there are men in this room to-day who will live to see the United States a nation of 100,000,000 people, a population of 50,000,000 in the territory tributary to the lakes, and clearances from the ports of the lakes in excess of 100,000,000 tons annually.

Shall we keep the colossal carrying trade of the Great Lakes in American hands or let it pass into the eager hands of Canada?

Shall this tremendous tide of traffic flow seaward down the Hudson to New York, or down the St. Lawrence to Montreal?

Shall we try to make it trickle through a 12-foot ditch with a toll-gate at each end?

Shall we commit the immeasurable folly of squandering $50,000,000 simply to "raise the Erie Canal to the next higher stage of inefficiency?"

Or shall we build a ship canal, broad and deep enough to give free passage to ocean vessels—a fitting pathway for the mighty commerce waiting to be carried on its waters?

I will not ask whether the physical problems can be solved—the question would be an insult to the engineers of our country.

Is the cost too great for a nation whose aggregate wealth exceeds eighty thousand million dollars ($81,750,000,000)?

Glasgow has spent $70,000,000 on the Clyde. Newcastle, between 1859 and 1890, expended $50,000,000 on the Tyne. Manchester has spent some $80,000,000 in the past few years to bring ocean navigation to her doors.

Do you tell me, as others have done, that the Manchester Canal has not proven a financial success as yet, and urge that fact as an objection to a ship canal from the lakes? That objection is easily answered, for the conditions in the two cases are radically different. Those which obtain in the one are clearly stated by the London Times in its issue of January 9, 1895, from which I quote:

> The promoters of the enterprise originally thought that they had only got to make a ship canal. They have found, or, more accurately, those who have entered into their labors have found, that in order to make the canal of any real service they have got to create a port also. * * * As a resort and headquarters for shipping Liverpool has behind it the experience and prestige of centuries; in the facilities it offers as a modern trading port it represents the adaptation and evolution of years. But to satisfy the sanguine hopes of some of its friends, and to meet the hasty detractions of many of its critics, Manchester must have repeated the miracle of the creation in Eden and come into existence full grown.

When our ship canal is built the ships that pass through it to the Great Lakes will find ready for their needs not one nor two, but near a hundred ports, many of them equipped with facilities nowhere surpassed, and some of them accustomed through many years to handle a tonnage which entitles them to rank high among the leading shipping centers of the world.

Chicago, or, to be exact, a portion of the city of Chicago, is spending, $32,000,000 to build a canal which is primarily for sanitary purposes, but which will one day be a link in a great waterway connecting the Great Lakes and the Gulf of Mexico by way of the Mississippi River. X

For the United States to build a ship canal between the Great Lakes and the sea would not be an undertaking one-twentieth as great, in proportion to population and resources, as any one of those which have been carried out by the cities named.

Russia is preparing to build a canal 1,000 miles long and 28½ feet deep to unite the Baltic with the Black Sea. The great Republic certainly has greater wealth than the great Empire. Is it inferior in enterprise?

Major Symons estimates the cost of a ship canal at $200,000,000, and is apparently so appalled at the magnitude of this suppositious expenditure that he is unable to properly appreciate either the amplitude of the resources available for its construction or the limitless benefits which would follow its completion.

I believe this estimate is entirely too high. For one thing, the colossal machinery and improved methods devised in connection with the Chicago Drainage Canal have reduced the cost of excavation on a large scale by at least one-half. And for another, I believe the invention of the Dutton lock will radically reduce the cost of a route which necessarily involves several hundred feet of lockage. But fortunately we shall not be compelled much longer to make mere guesses at the cost of this great work, but will have instead an estimate made by a board of eminent engineers, and based upon detailed surveys and a careful study of all the elements of the problem.

This board, which was appointed by the President in accordance with a provision of the sundry civil act which was approved June 4, 1897, consists of Major Raymond, of the United States Engineer Corps, and Messrs. George Y. Wisner, of Detroit, and Alfred Noble, of Chicago.

This board of engineers is actively at work, and while I am not informed as to when it will be ready to report, and am certainly not authorized to forecast the nature of that report in any particular, the composition of the board leads me to confidently expect that it will recommend an outlet from the Great Lakes to the sea which will be worthy of the magnificent commerce which it is to serve, and the imperial resources of the Government by which it will be built.

I do not know whether it will be the privilege of the present Congress to inaugurate this great work or not, but the legislators who shall authorize its construction will render a service to the nation no less valuable and with no less important and far-reaching results than was that performed by the armies which saved the Union from destruction.

For while it is a physical impossibility to move the States and Provinces of the West and the Northwest any nearer to the sea, when you shall build a ship canal which brings ocean navigation to their doors, you will practically have moved them a thousand miles or more nearer the markets of the world, because "not mileage but cost of transportation is the true commercial measure of distance."

Nor will it be of value to the West alone. The populous manufacturing centers of the East shall find profit in abundant food supply and cheaper raw materials, and for the fruits, the sugar, and the cotton of the South there will arise a greatly increased demand. It would be, not as a figure of speech but in very truth, a perennial fountain of prosperity, whose radiating streams would penetrate and fertilize every portion of the continent, and whose benefits would increase and multiply through all the coming centuries till man shall steal the secret of the birds and navigate the viewless air.

SUMMARY.

I have covered quite a wide range in the discussion of my subject, Mr. Chairman, and, if your patience will permit, I think it would be well to give a summary of the points presented and the conclusions reached therein.

"Economy of transportation is the chief element in the prosperity of every state and nation."

Railways do not and can not compete with deep waterways in cheapness of transportation.

Waterways not only furnish the cheapest possible transportation, but constitute the most powerful possible regulators of railway rates.

Waterways are also the most powerful possible contributors to the prosperity of parallel railways.

In a completely developed system of inland transportation waterways and railways have essentially different functions.

The essential function of waterways is the carriage of raw materials, in which weight and bulk are large in proportion to value and in the movement of which cheapness is the chief consideration.

The essential function of railways, aside from the handling of passenger traffic, express matter, and mails, is the carriage of finished products, in the movement of which speed and regularity are of more importance than economy.

In the last analysis railways and waterways are not competitors, but complements; not antagonists, but auxiliaries.

The foregoing conclusions are so abundantly sustained by the results of experience and observation that they become, not the enunciation of theoretical deductions, but a simple statement of officially ascertained facts; hence it follows that—

Government will most effectually promote national prosperity by making the completest possible development of waterways, with the resulting economy of transportation; and that—

In the absence of governmental action in the interest of its citizens, it would be sound business policy for railways to use their financial resources to the utmost to secure the development of waterways.

For an outlet from the Great Lakes to the sea, the specific waterway under consideration, the United States Deep Waterway Commission recommends a depth of not less than 28 feet.

Major Symons, of the United States Engineer Corps, stationed at Buffalo, recommends for such outlet a large canal with a depth of 12 feet.

Within reasonable limits the efficiency of a navigable channel increases as the cube of the depth.

A ship canal would be invaluable from a military standpoint, as it would allow war ships to enter the lakes in case of war with Great Britain, and render the entire lake fleet available for conversion into naval auxiliaries for use upon the sea in case of war with Spain or other powers.

The controlling considerations which demand the construction of a ship canal are commercial rather than military.

The commerce of the Great Lakes is far greater than that carried on any other inland waters in the world, the aggregate clearances for the season of 1896 (American vessels from American ports only) being more than 53,000,000 tons.

The commerce of the lakes is great, not only in comparison with that on other inland waters, but also with that of the great ocean ports of the world, the tonnage named surpassing the clearances of the principal seaports of Great Britain, France, Belgium, and the United States for the same year, viz: London, Liverpool, Cardiff, Glasgow, Tyne ports, Havre, Dunkirk, Marseilles, Antwerp, New York, Boston, Philadelphia, Baltimore, New Orleans, and San Francisco.

This colossal commerce, on its way to the seaboard and to foreign ports, is delayed and hampered by its transmission through the Erie Canal, and burdened with excessive and exorbitant charges for the unavoidable transfers at each end of that shallow waterway.

Rates on the Erie Canal are five times as high per ton per mile as on the Great Lakes, and the transfer charges exacted by the elevator monopoly at Buffalo are practically equivalent to the lake freights from Chicago, 900 miles. Transfer charges in New York are much higher still.

Transfer charges on grain at Buffalo and New York (only grain exported being considered in New York) amounted to nearly $8,000,000 for the single year 1897, and during the past ten years aggregated over $46,000,000.

These tremendous tolls would probably be somewhat reduced by the building of a barge canal.

They would be completely and permanently destroyed by the construction of a ship canal.

Lake commerce in the past has always outrun all provisions made for it. The most sanguine prophecy has always fallen far short of the sober reality.

Lake commerce, large as it already is, is only in the first stages of development.

Even in the American Northwest only a small proportion of the arable land is under cultivation.

The Canadian Northwest contains the physical basis for an empire, and will one day have a population of many millions.

The surplus products of the whole Northwest will cross the waters of the Great Lakes on their way to the markets of the world.

A barge canal would be outgrown before it could be completed.

A barge canal could not prevent the threatened diversion of American trade to Canadian ports.

A ship canal through Canadian territory would destroy American supremacy on the lakes.

A ship canal through American territory would restore American supremacy on the sea.

Lake Superior iron deposits and lake transportation of their ores have given the United States the first position in the production of iron and steel.

A ship canal would give the United States control of the iron markets of the world and transfer the center of the steel ship building industry from the banks of the Clyde to the shores of the Great Lakes.

Major Symons's figures give the barge canal an apparent advantage in the transportation of grain of 27 cents per ton.

This conclusion is radically wrong, because based upon erroneous premises.

His assumption that vessels would spend as many days in port in New York as they now spend hours in port on the lakes, is not only absurd on its face, but is proven false by the record of actual results in handling cargoes.

His calculated cost of transportation includes the cost due to delays caused by transfers, which transfers, delays, and cost would be eliminated by a ship canal.

The cost due to transfers, as distinguished from charges made for transfers, constitutes 39 per cent of the present price for carrying wheat from Chicago to Liverpool, and more than 55 per cent of the total cost of such transportation is due to movement across the State of New York—less than 10 per cent of the total distance.

Eliminating the errors referred to and we find that a ship canal would have an advantage of $1 per ton over the barge canal and $2 per ton over existing conditions.

Major Symons's estimate of the cost of a ship canal is $200,000,000, which would involve an annual expense for interest, maintenance, and operation of $8,000,000. This estimate is probably too high, considering the recent invention of improved locks and excavating machinery.

Estimates made at present are necessarily mere guesses, but the Board of Engineers now studying the problem will in due time furnish us an accurate estimate based upon detailed surveys.

Major Symons's estimate of the probable tonnage which would use a ship canal is 24,000,000 tons. This estimate is probably too low, and even if correct for the present time, will soon be greatly surpassed. The commerce of the St. Mary's Falls Canal has doubled in the past five and one-half years, and is more than ten times as great as in 1880.

Granting that Major Symons's estimates of cost and tonnage are correct, the saving in the single item of transfer charges on grain at Buffalo and New York would equal the annual cost of a ship canal.

On the tonnage estimated by Major Symons a saving of $2 per ton would amount to $48,000,000 per year, equal to a net profit of 25 per cent on the estimated cost.

On the principle that an exported surplus fixes the price in home markets, a ship canal, by decreasing the transportation cost on the grain exported, would have increased the value of the principal cereal crops of the United States in 1897 by $192,000,000.

Major Symons is certain that ocean vessels would not use the ship canal if built. English engineers were just as certain thirty-five years ago that the Suez Canal would not be used if built.

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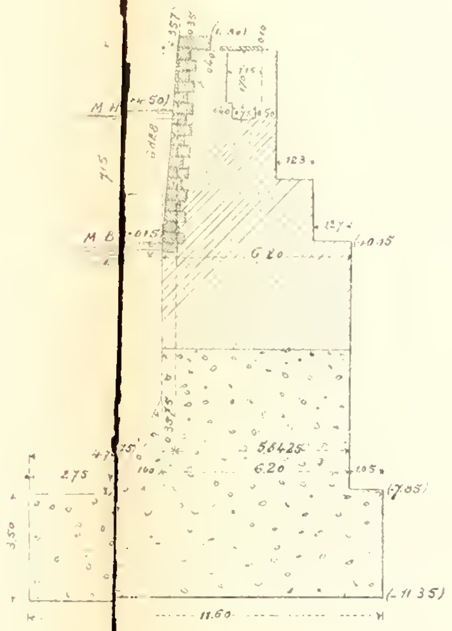
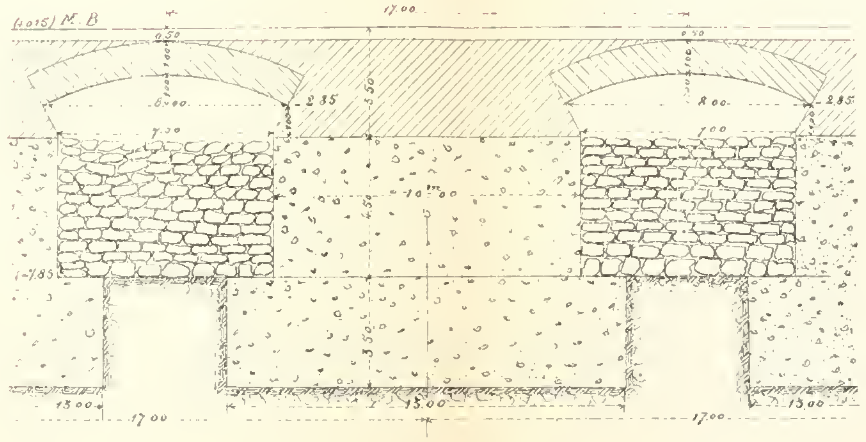
Projet N° 3.

Fig 1.



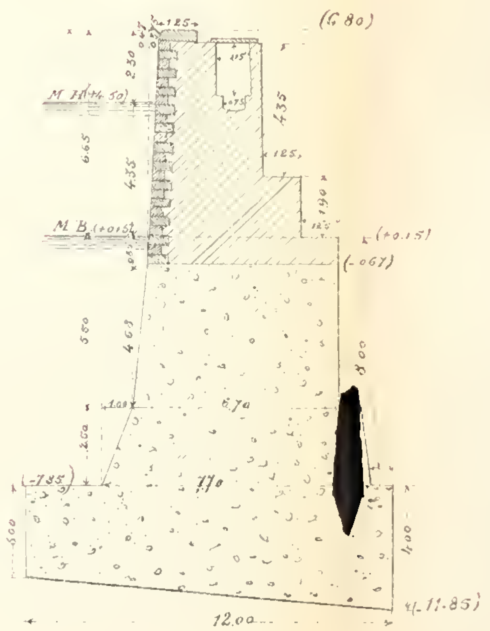
Projet N° 3

Fig. 2



Projet N° 4.

Fig 3.



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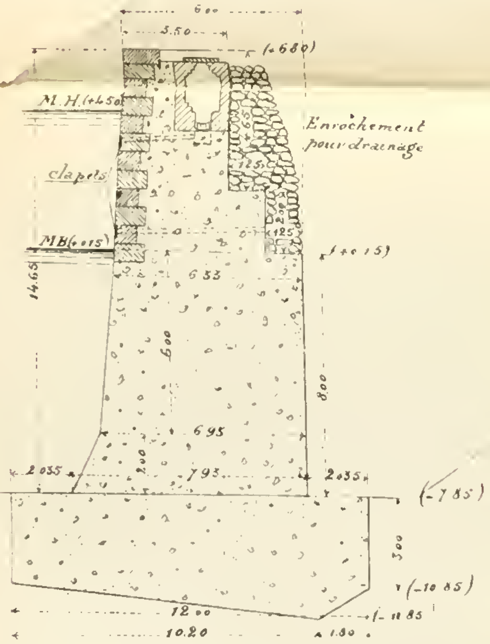
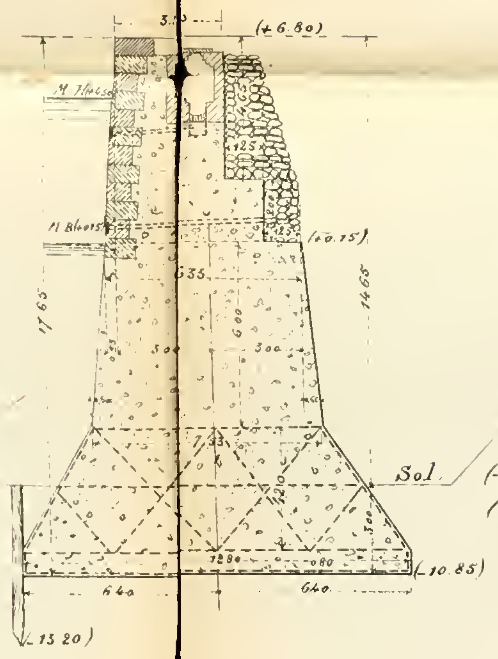
Projet N° 5

Fig. 4



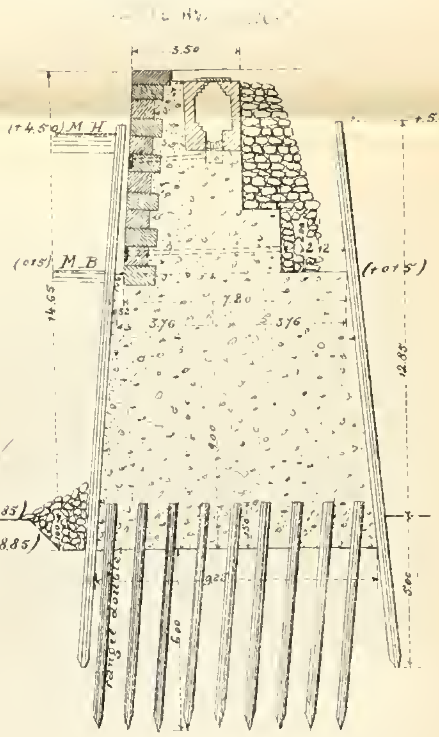
Projet N° 6.

Fig. 5



Projet N° 7

Fig. 6.



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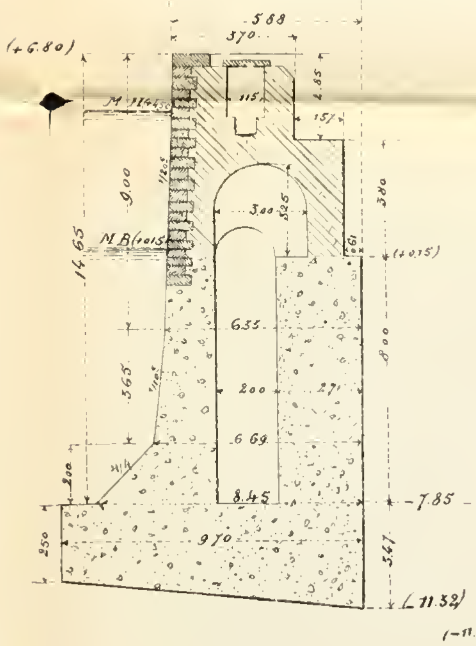
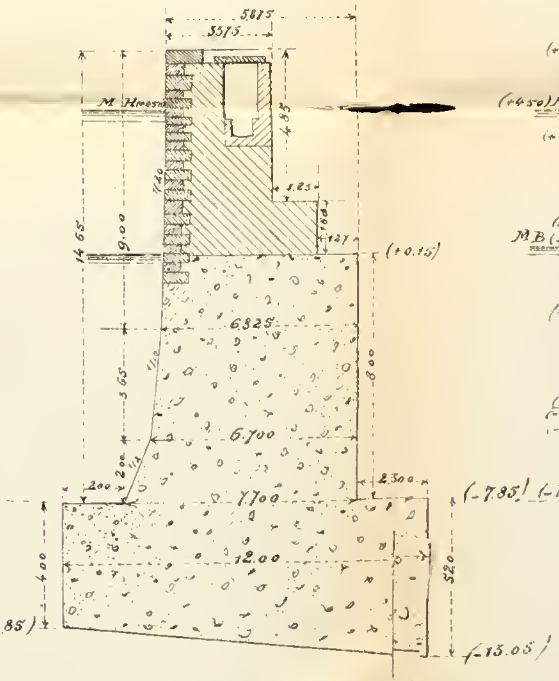
Projet N° 8

Fig. 7.



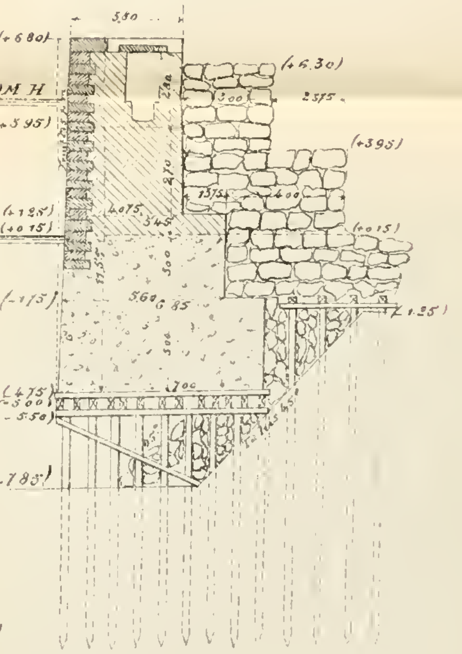
Projet N° 9.

Fig. 8.



Projet N° 10.

Fig. 9.



Echelle 0.005 p m

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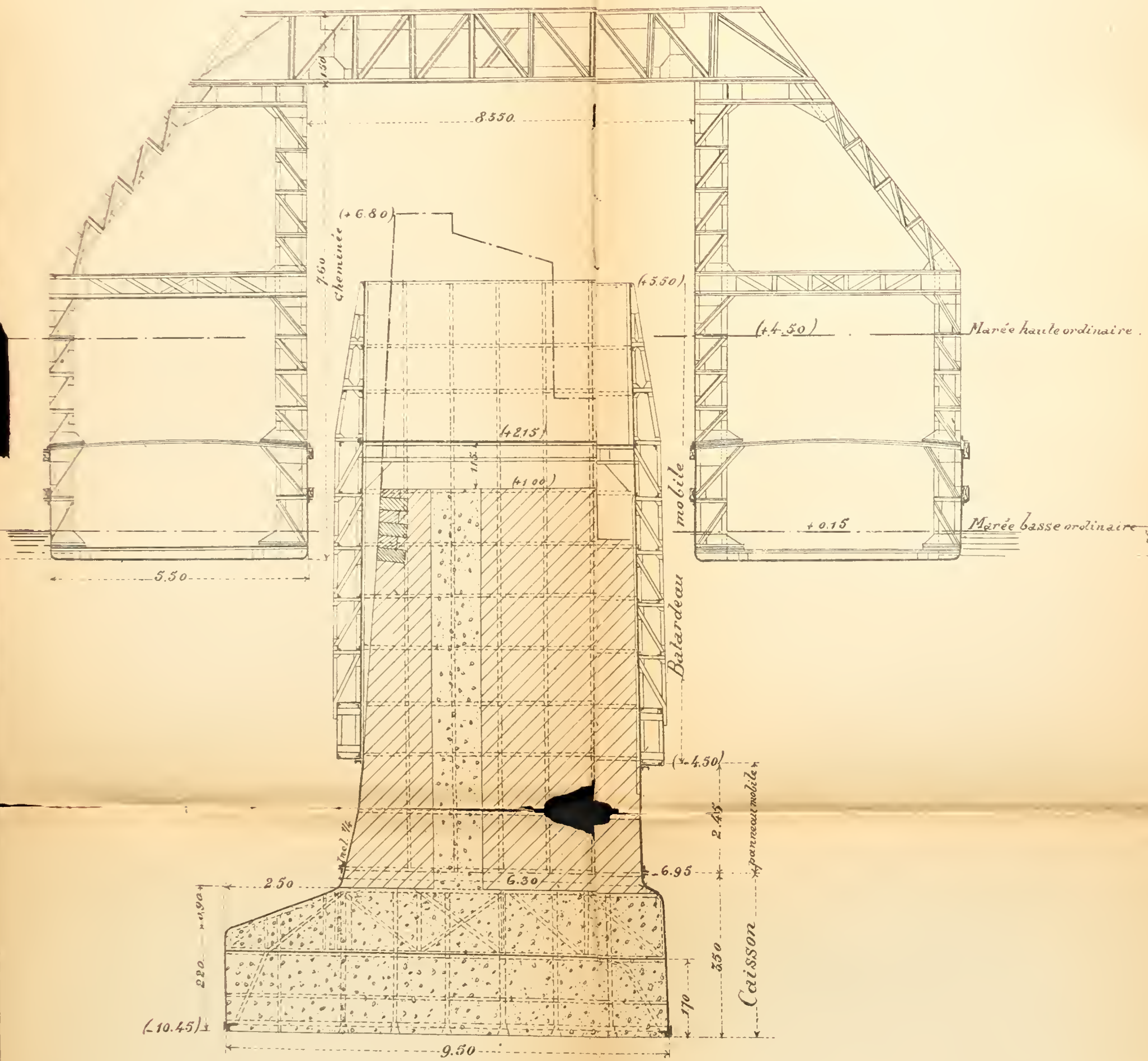
Dispositif des installations à la fin de la construction d'un tronçon

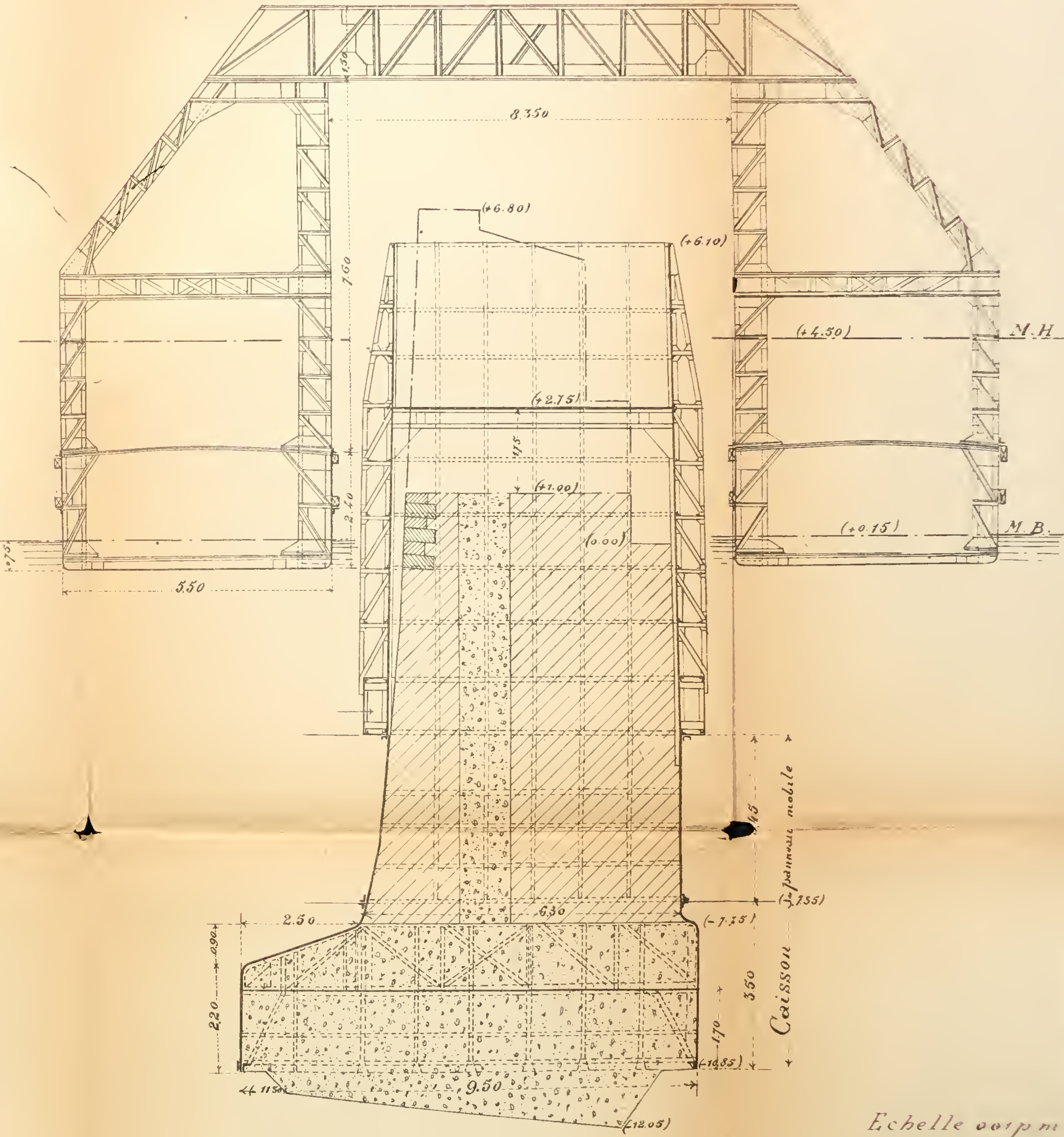
Première période

Fig. 1.



Seconde période.

Fig. 2.



Echelle 0.01 p m